A GERNSBACK PUBLICATION

AIR WONDER STORIES

OCTOBER
1929
25 CENTS
Canada 30c

HUGO GERNSBACK
Editor

Science-Aviation Stories
by
ED. EARL REPP
HARL VINCENT
HENRIK DAHL JUVE

Amazingly Easy Way to get into ELECTRICITY

Don't spend your life waiting for $5 raises in a dull, hopeless job. Now . . . and forever . . . say good-bye to 25 and 35 dollars a week. Let me show you how to qualify for jobs leading to salaries of $50, $60 and up, a week, in Electricity—NOT by correspondence, but by an amazing way to teach, that makes you an electrical expert in 90 days! Getting into Electricity is far easier than you imagine!

Learn Without Lessons in 90 DAYS

Lack of experience—age, or advanced education bars no one. I don't care if you don't know an armature from an air brake—I don't expect you to! I don't care if you're 16 years old or 48—it makes no difference! Don't let lack of money stop you. Most of the men at Coyne have no more money than you have.

Railroad Fare Allowed

I will allow your railroad fare to Chicago, and if you should need part-time work I'll assist you to it. Then, in 12 brief weeks, in the great roaring shops of Coyne, I train you as you never dreamed you could be trained . . . on the greatest outlay of electrical apparatus ever assembled in any electrical school . . . costing hundreds of thousands of dollars . . . real dynamos, engines, power plants, autos, switchboards, transmitting stations . . . everything from doorbells to farm power and lighting . . . full-sized . . . in full operation every day!

No Books-No Printed Lessons

No books, no baffling charts . . . all real actual work . . . right here in the great Coyne school . . . building real batteries . . . winding real armatures, operating real motors, dynamos and generators, wiring houses, etc., etc. That's a glimpse of how we make you a master practical electrician in 90 days, teaching you far more than the average ordinary electrician ever knows and fitting you to step into jobs leading to big pay immediately after graduation. Here, in this world-famous *Parent school*—and nowhere else in the world—can you get such training!

Prepare for Jobs Like These

Here are a few of hundreds of positions open to Coyne-trained men. Our free employment bureau gives you lifetime employment service.

Armature Expert	to $150 a Wk.
Substation Operator	$60 a Week and up
Auto Electrician	$125 a Week
Inventor	Unlimited
Maintenance Engineer	up to $250 a Week
Service Station Owner	up to $200 a Week
Radio Expert	up to $100 a Week

Jobs-Pay-Future

Dont' worry about a job, Coyne training settles the job question for life. Demand for Coyne men often exceeds the supply. Our employment bureau gives you a lifetime service. Two weeks after graduation Clyde F. Hart got a position as electrician for the Great Western Railroad at over $100 a week. That's not unusual. We can point to Coyne men making up to $600 a month. $60 a week is only the beginning of your opportunity. You can go into radio, battery, or automotive electrical business for yourself and make up to $15,000 a year.

GET THE FACTS

Coyne is your one great chance to get into electricity. Every obstacle is removed. This school is 30 years old—Coyne training is tested—proven beyond all doubt—endorsed by many large electrical concerns. You can find out everything absolutely free. Simply mail the coupon and let me send you the big, free Coyne book of 150 photographs . . . facts . . . jobs . . . salaries . . . opportunities. Tells you how many earn expenses while training and how we assist our graduates in the field. This does not obligate you. So act at once. Just mail coupon.

Now in Our New Home

This is our new, fireproof, modern home wherein is installed thousands of dollars' worth of the newest and most modern Electrical Equipment of all kinds. Hence we have the largest amount of floor space devoted to the exclusive teaching of practical electricity in the world. Every comfort and convenience has been arranged to make you happy and contented during your training.

Get This FREE Book

Mr. H. C. LEWIS, President
COYNE ELECTRICAL SCHOOL, Dept. 79-01, 500 S. Paulina St., Chicago, Ill.

Dear Mr. Lewis:

Without obligation send me your big free catalog and all details of Railroad Fare to Chicago, Free Employment Service, Radio, Aviation Electricity, and Automotive Courses, and how I can "earn while learning."

Name .....

Address .....

City ..... State .....

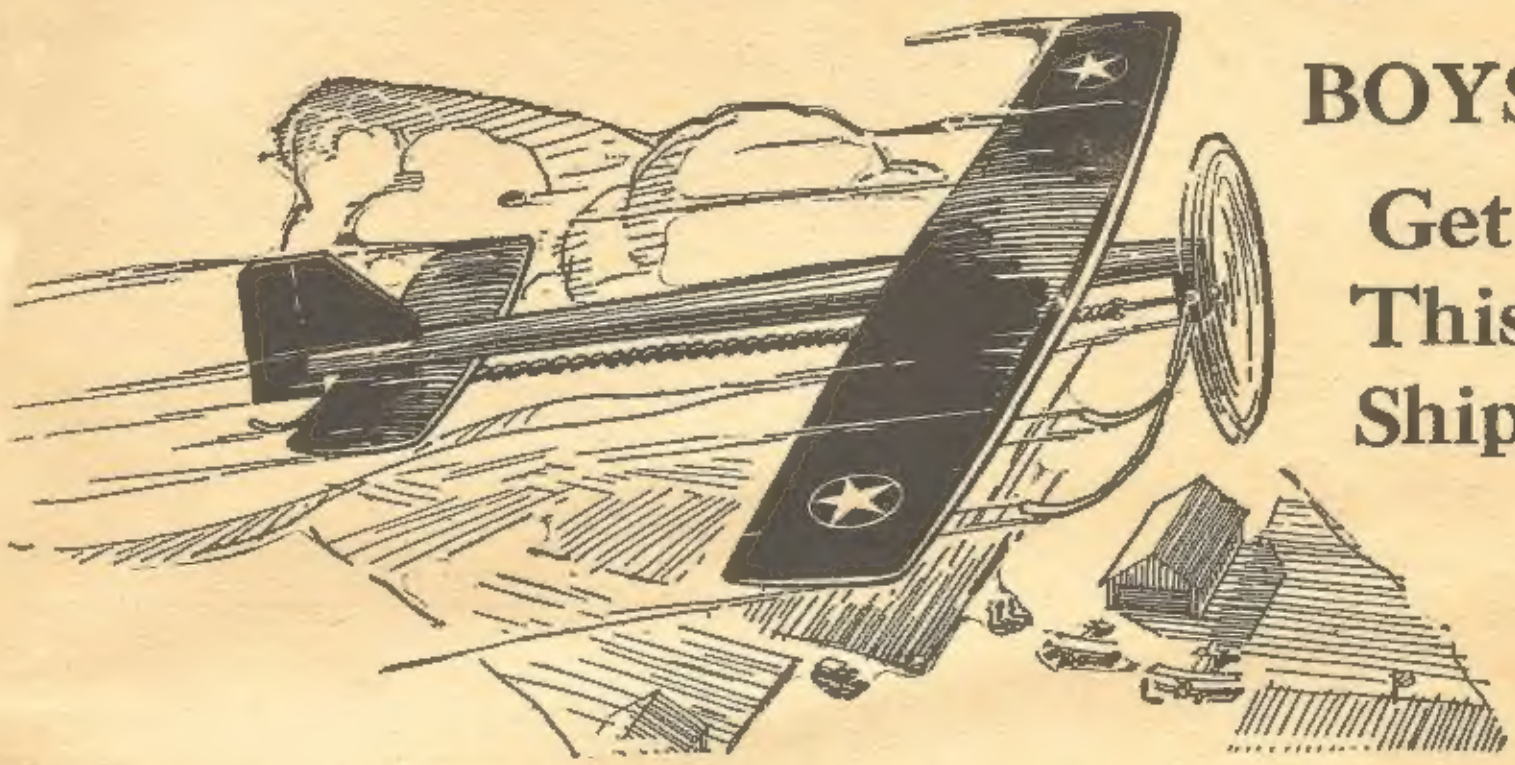
COYNE ELECTRICAL SCHOOL

H. C. LEWIS, Pres. *Established 1899*

500 S. Paulina Street • Dept. 79-01 • Chicago, Illinois

Supreme Achievement in a Model Plane

The RED ACE *Combat Pursuit Ship*



BOYS! Get This Ship

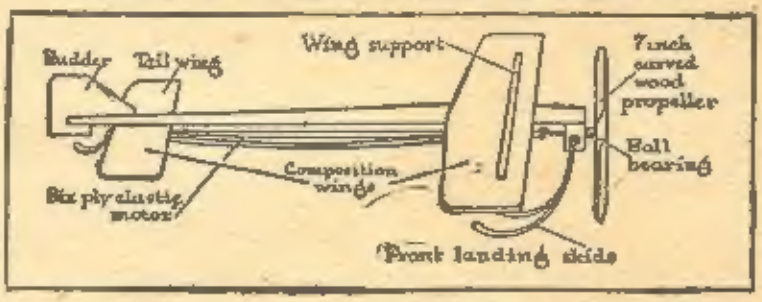
Rises from Ground—Soars 60 Feet

The development of the Red Ace Combat Pursuit Ship will be nothing short of sensational in the world of model planes. Here's one plane that will not disappoint you—one plane that will perform like a real ship. Has wing spread 16" with main fuselage 14"; reinforced main wing; perfectly balanced tail wing and adjustable rudder. Main wing can be shaped to suit conditions. Has front landing gear and rear skid. The perfectly carved 7" wood propeller is a particularly fine feature. Has ball bearings on propeller shaft; 6-ply motor of newly developed extra strong para rubber. This is not a construction set, but a completely assembled plane. Simply fasten wings and launch.

Will Outperform Planes Costing 5 Times More

The Red Ace will rise from ground under its own power. Will climb easily to 60 feet. Will soar over rooftops and buildings. Then glide perfectly to earth. This large-sized, carefully made plane will outperform many planes costing 5 times more. It is guaranteed to fly. It is guaranteed to rise from the ground under own power. This plane will please any boy immensely. A perfect marvel of simplicity and powerful performance. Whether you now own a model plane or not, whether you own 50 model planes, you will want the Red Ace. It will be the prize ship in your hangar. Don't let a day slip by until you order this plane.

Look at These Great Features



You May Have It FREE!

The Open Road for Boys Magazine has 50 pages every month crammed with thrilling, breath-taking stories that will hold you spellbound. Just the kind of stories you've been looking for. Interesting, tense stories of high adventure on land and sea and in the air. Tales of deep mystery. Airplane stories, the best published. Sport stories, stories of school life. Marvelous departments and special instructive articles. Lots about model planes. The Open Road for Boys is the fastest-growing boys' magazine in America. You'll think it is great! Regular subscription price $1 a year. Rush us your subscription today on coupon below and we will give you free the Red Ace Combat Pursuit Ship. But you must act at once.

ALL *for only* $1.00

The Red Ace is a plane so carefully thought out, so cleverly constructed that it will enable you to compete with other boys with the most expensive planes, and win! This plane is a remarkable performer—a plane that you will be proud to own.

This Is a Great Bargain Offer

Hurry Your Order TODAY →

Pilot Dayton, Open Road for Boys,
130 Newbury St., Boston, Mass.

Canadian postage 50c
Foreign $1 extra.

Friend:
Bet your life! I will grab the big offer. Here's my dollar. Put me down for a year's subscription to The Open Road for Boys and rush me the Red Ace Combat Pursuit Ship.

Name .....
Street .....
Town or City .....
State .....

Volume 1—No. 4

Publication Office, 404 North Wesley Avenue, Mt. Morris, Illinois
Editorial and General Offices, 96-98 Park Place, New York City

October, 1929

Published by
STELLAR PUBLISHING CORPORATION
H. GERNSBACK, Pres. I. S. MANHEIMER, Sec'y S. GERNSBACK, Treas.

Table of Contents
October

THE SKY MANIAC
By Henrik Dahl Juve.....294
AROUND THE WORLD IN 24 HOURS
By R. H. Romans.....306
THROUGH THE AIR TUNNEL
By Harl Vincent.....314
THE AIR SPY
By Edward Lee Harrison.....322
THE ARK OF THE COVENANT
(A Story in Four Parts) (Part 4)
By Victor MacClure.....326
THE INVISIBLE RAIDERS
By Ed Earl Repp.....352
THE ROBOT MASTER
By O. Beckwith.....360
WHAT IS YOUR AVIATION KNOWLEDGE?
Aviation Questionnaire.....313
AVIATION NEWS.....369
AVIATION FORUM.....371
THE READER AIRS HIS VIEWS
Letters From Our Readers.....372

On the Cover This Month

is illustrated the story "Through the Air Tunnel," by Harl Vincent. Here we see how the special air car moves at the rate of over one thousand miles an hour, through the artificially created vacuum in the air tunnel.

By electrical means the inside of the air tunnel becomes a vacuum in which the onrushing car moves free of friction.

NEXT MONTH

CITIES OF THE AIR, by Edmond Hamilton. This versatile author has produced a hair raiser that for sheer audacity and excellent science certainly deserves first place as a finished aviation story. We have no doubts about proclaiming it the best story of the kind produced during 1929. Imagine the City of New York, as well as any other city of the world, not built on *terra firma,* but actually floating in the sky, built as it is on huge steel platforms that support the city. There are excellent reasons for this, and from a technical standpoint it is not as absurd as it may seem at a first glance. You simply must read this wonderful story.

SUITCASE AIRPLANES, by E. D. Skinner. Some years ago, a German scientist came forth with the announcement that *real* aviation would not be a practicality until someone had invented a "horsepower in a watch." What the German scientist really meant was that the power of one horse should not occupy a greater weight and size than an ordinary watch. Sooner or later this problem will be solved. As a matter of fact the editor of this magazine, some years ago, made some experiments with a dynamite motor which came pretty close to fitting these requirements. The present story moves along these lines and is indeed aviation "plus."

WHEN SPACE RIPPED OPEN, by Ralph Wilkins. It is already accepted that our world can have more than three dimensions. What lies beyond the third dimension is still a mystery to us, but there is no doubt that what it contains is something stranger than we have ever imagined. Existing in the same space that we do, there may be any number of other objects, animals, people and cities. The present author has used this idea in a most astonishing manner, to show what might happen if space once ripped open. Incidentally he has given in a swiftly-told and extraordinarily well-written story what the value of the airplane would be to humanity if a great catastrophe descended on it.

BEYOND THE AURORA, by Ed Earl Repp. Our versatile author introduces in this speedy story his characters, Capt. Wollack and Professor Standish, who displayed such amazing talent in the "Invisible Raiders." The rocket such as is pictured here is already receiving serious attention in Europe, and the speeds mentioned by the author are well within the range of future possibilities. This story is one of Repp's best; do not by any chance miss it.

STREAMERS OF DEATH, by Henrik Dahl Juve. It is seldom that an author combines the scientific talent of Mr. Juve, and his ability to weave scientific incidents into a thrilling story. The power of the scientific mind is so vast and so far-reaching that when it is turned against the world, humanity well may shudder. In this strange story the world barely escapes extinction at the hands of such a master mind. This is by far Mr. Juve's best story.

AND OTHERS.

AIR WONDER STORIES is published on the 10th of the preceding month. 12 numbers per year. subscription price is $2.50 a year in United States and its possessions. In Canada and foreign countries, $3.00 a year. Single copies 25c. Address all communications for publication to Editor, AIR WONDER STORIES, 96-98 Park Place, New York. Publishers are not responsible for lost Mss. Contributions cannot be returned unless authors remit full postage.
AIR WONDER STORIES—Monthly—application for second class matter in the Postoffice at Mt. Morris, Ill., under the act of March 3, 1879, pending. Title registered U. S. Patent Office. Trademarks and copyrights by permission of Gernsback Publications, Inc., 98 Park Place, New York City, Owner of all trademark rights. Copyright 1929, by G. P., Inc. Text and illustrations of this magazine are copyright and must not be reproduced without permission of the copyright owners.
AIR WONDER STORIES is for sale at principal newsstands in the United States and Canada. European agents: Brentano's, London and Paris. Printed in U. S. A.
IF YOU WISH TO SUBSCRIBE to AIR WONDER STORIES, make out all remittances to the Stellar Publishing Corp. Be sure to mention the name of the magazine you wish to subscribe for, as we are also agents for the following magazines: RADIO-CRAFT and SCIENCE WONDER STORIES, subscription price of which is the same as AIR WONDER STORIES. SCIENCE WONDER STORIES QUARTERLY, $1.75 a year. Subscriptions can be made in combination with the above publication, at a reduced club rate. Ask for information.
Subscriptions start with current issue. WHEN YOUR SUBSCRIPTION EXPIRES, we enclose a renewal blank in the last number. No subscriptions continued unless renewal remittance received.
Change of Address. Always give us old as well as new address and notify us as far in advance as possible.

STELLAR PUBLISHING CORPORATION
Publication Office, 404 North Wesley Avenue, Mt. Morris, Illinois. Editorial and General Offices, 96-98 Park Place, New York City.

THEN CHOOSE AVIATION!

Think what Aviation offers you. Thrills such as you never had before! The praise and plaudits of the multitude. And a chance to get in on the ground floor where rewards will be unlimited!

Easy to Become an Aviation Expert!

ARE YOU a red-blooded daring he-man? Are you eager for a life of constant thrills, constant excitement and fascinating events? Do you crave adventure? popularity, admiration, and the applause of great flying crowds? Then why not get into the Aviation Industry—the greatest adventure since time began—the greatest thrill ever offered to man?

Aviation is growing so swiftly that one can hardly keep track of all the astonishing new developments. Airmail routes have just been extended to form a vast aerial network over the entire U. S. Airlines and airplane factories are springing up all over the country. Men like Henry Ford are investing millions in the future of commercial Aeronautics in America! The possibilities are so tremendous that they stagger imagination!

Pick Your Job

Airplane Instructor
Airplane Engineer
Airplane Repairman
Airplane Assembler
Airplane Mechanician
Airplane Inspector
Airplane Builder
Airplane Salesman
Exhibition Manager
Airplane Contractor
Airplane Designer
Airplane Motor Expert

Big Future

Everything is set for the greatest boom in history. The fortunes that came out of the automobile industry and out of motion pictures will be nothing compared to the fortunes that will come out of aviation! There is just one thing holding it up—lack of trained men! Even in the beginning thousands will be needed—and generously paid. The opportunities open to them cannot be overestimated. Those who qualify quickly will find themselves on the road to undreamed of money—success—popularity—and prominence!

Get into this thrilling profession at once, while the field is new and uncrowded. Now—by a unique new plan—you can quickly secure the basic training for one of these wonderful high-salaried jobs, at home, in spare time. Experts will teach you the secrets—give you all the inside facts that are essential to your success. And, the study of Aviation is almost as fascinating as the actual work itself. Every lesson is chock-full of interest—and so absorbing that you actually forget you are studying. But best of all are the ultimate rewards you are fitting yourself to gain!

Send for FREE Book

Send the coupon for our new, free book, just out—*Opportunities in the Airplane Industry*. It is vitally interesting, reads like a romance and tells you things about this astonishing profession you never even dreamed of. We offer a limited number of copies FREE. Write for yours today.

American School of Aviation
Dept. 3076
3601 Michigan Ave.
Chicago, Ill.

American School of Aviation
Dept. 3076, 3601 Michigan Ave.
Chicago, Ill.

Without any obligation please send me FREE book, Opportunities in the Airplane Industry. Also information about your course in Practical Aeronautics.

Name ..... Age.....

Address .....

City ..... State.....

NEW SCIENCE FICTION SERIES

Brand New Series

We are presenting to our readers the first six numbers of our new *Science Fiction Stories*. These small books, illustrated by artist Paul, are printed on a good grade of paper and are sold at a low price, due to the large amount put out. New ones will be issued from time to time.

REMEMBER THESE ARE BRAND NEW STORIES AND HAVE NOT BEEN PUBLISHED BEFORE IN ANY MAGAZINE. THEY CAN ONLY BE SECURED THROUGH THE SCIENCE FICTION SERIES.

Every book contains but a single story by a well-known science fiction author. The type is large and well-readable, and the size of each book is 6x8 in., which makes it convenient to carry in your pocket.

Below you will find a list of the first six books. Your choice of five books for 50c or the entire six books for 60c prepaid. Not less than five books sold.

1—THE GIRL FROM MARS
By Jack Williamson and Miles J. Breuer

Suppose some one from another planet landed on our earth. What would happen? "The Girl from Mars," is an adventure of a Martian visitor, with all the strange situations that one can imagine in such an event.

2—THE THOUGHT PROJECTOR
By David H. Keller, M.D.

The power of suggestion on the human mind forms the basis of "The Thought Projector." Ideas repeated over and over exert a great force on us. They penetrate our minds and give us ideas that we often think are our own.

3—AN ADVENTURE IN VENUS
By R. Michelmore

Aviation five hundred or a thousand years hence will probably be something beyond most of our present conceptions. Journeys to other planets may well become a commonplace as it does in the present story.

4—WHEN THE SUN WENT OUT
By Leslie Stone

The sun is said to be slowly cooling, and generations many thousands of years hence must face the problem of how their heat and light is to be provided when the sun's end does come. In this thrilling story, Leslie Stone answers that question.

5—THE BRAIN OF THE PLANET
By Lilith Lorraine

If a super-intelligence could have its wisdom poured into our brains, what a different world we might have. Miss Lorraine poses such a problem and works out the answer in an astounding manner.

6—WHEN THE MOON FELL
By Charles H. Colladay

Collisions between celestial bodies of any size have not occurred within historical times. But such an event is not an impossibility. In fact many astronomers believe that our solar system came into being by such a collision. Suppose the moon were to crash into the earth. What would happen?

STELLAR PUBLISHING CORP.,
A.W.-10 98 Park Place, New York, N. Y.

Gentlemen:

I am enclosing herewith $.....for which please send me prepaid books which I have marked with an X:

[ ] 1 THE GIRL FROM MARS
[ ] 2 THE THOUGHT PROJECTOR
[ ] 3 AN ADVENTURE IN VENUS
[ ] 4 WHEN THE SUN WENT OUT
[ ] 5 THE BRAIN OF THE PLANET
[ ] 6 WHEN THE MOON FELL

Name .....

Address .....

City .....State .....

VOLUME 1
No. 4

AIR WONDER • STORIES

OCTOBER
1929

The Future of Aviation Springs from the Imagination

HUGO GERNSBACK, *Editor-in-Chief*

DAVID LASSER, *Literary Editor*

FRANK R. PAUL, *Art Director*

Associate Aviation Editors

MAJOR WILLIAM A. BEVAN, B.S., M.S., M.E.,
Air Corps Reserve
Professor Aeronautical Engineering, Iowa State College

PROFESSOR GEORGE J. HIGGINS, B.S. Aero. Eng.
Associate Professor Aeronautical Engineering, Univ. of Detroit

PROFESSOR EARL D. HAY, B.S., M.S., M.E.
Head Department Mechanical and Industrial Engineering and Professor of Aeronautics, University of Kansas

PROFESSOR FELIX W. PAWLOWSKI, M. & E.E., M.S.
Department of Aeronautical Engineering, University of Michigan

PROFESSOR JOHN E. YOUNGER, B.S., M.S., Ph.D.
Dept. Mechanical Engineering, University of California

These aeronautical experts pass upon the scientific principles of all stories

AIRSHIP *vs.* AIRPLANE

By HUGO GERNSBACK

FOR some time the question has been vigorously debated in the public mind as to what form of aircraft will prevail in the long run? There is one school of experts who back the Zeppelin, or *"lighter-than-air"* machine (the *Airship* proper), as opposed to the partisans of the Airplane type, the *"heavier-than-air"* machine.

It is true that each of these types has admitted advantages over the other; but, in my opinion, the Airplane or some other "heavier-than-air" flier is bound to prevail in the long run and, in all probability, will be the type universally used in the future.

In view of this, it may be surprising to note that the development of Zeppelin or rigid-airship design is still in the ascendancy, and certainly, has not reached its ultimate size or power. The reason for this is that the Zeppelin reached the stage of practical operation much earlier than the Airplane and, even a few years ago, its factor of safety was much higher than that of the Airplane. In Germany, particularly, the dirigible was therefore acclaimed as the coming type of aircraft.

The great trouble, however, with the Zeppelin or Airship is its great bulk, with consequent difficulty of maneuvering, and its slow speed compared to the high speed and greater mobility of the Airplane.

It is true that, for some years to come, the Airship will probably continue popular because it cannot be overlooked as an economic factor in the transportation of mail and other lucrative fast freight. It is possible to-day to have safe trans-Atlantic aerial traffic by means of the Zeppelin; whereas such a service is not yet possible with airplanes. The Zeppelin, because it is faster than any steamship, can obtain valuable mail and express contracts; and the Airship type will therefore in all probability be utilized until it has been made obsolete by the superior technique of the future Airplane.

Of great significance is a recent statement by Commander Sir Charles R. Burney of the new giant British dirigible, the *R-100*, which has been just put in commission. Sir Charles estimates that a dirigible, to be profitable, must have a capacity of at least ten million cubic feet (the *Graf Zeppelin* has 3,500,000). In addition to this, he points out that the problem of landing facilities is the most serious one; for man-power is insufficient to berth such monsters of the air. And, though the *R-100* has a top speed of eighty miles an hour, this is slow in comparison with that of airplanes.

Sir Charles is also quoted as saying: "When an airship can cross the Atlantic westbound in two and a half days with fifty passengers the steamship lines will have to consider the competition. Until then the *Graf Zeppelin's* flights are interesting scientifically only—not as of practical interest to travelers. An airship cannot attain this speed until the size is doubled, which means overcoming landing difficulties. There is the situation in a nutshell. There is nothing more to say about it."

Doubtless, Airships can, and will be, built ten times larger than the *Graf Zeppelin*, and in the years to come we will see wonders done with these Leviathans of the air; bu the chances are that fifty years later they will be forgotten, as the "prairie schooners" of eighty years ago are to-day.

The SKY MANIAC

BY

Henrik Dahl Juve

As they watched, paralyzed, the building and air barge fell apart and hurtled toward the earth. The entire train had been split from end to end. The attacker now swung back and then darted away.

THE SKY MANIAC

EVENING was deliberately shaking out her mantle of glowing colors preparatory to tucking the earth in for the night. As she worked she hummed and buzzed a soft bedtime air of unutterable longing, as though she were groping blindly, almost desperately about the vast realms of the limitless universe for answers—always for answers.

Theodore A. Addison stood in a near-trance as he listened to this almost imperceptible yet thunderous song of evolution and felt it tug and drag at him, urging him to pull up the orthodox anchor and cast himself loose upon the tide of unknown cosmic oceans to help in this mighty search for answers—always for answers.

Through his experiments during the twentieth century he had discovered a means of changing his consciousness from the three-dimensional world to the four and five-dimensional spaces and had thus transplanted himself into the future—the twenty-eighth century. Although Captain Burke Gauthier, his newfound friend and guide, now stood silently at his side above the underground hangars and laboratories of the Occidental Secret Service located near New York City, he felt strangely alone, with a vague sensation something akin to homesickness—for what?

HENRIK DAHL JUVE

Suddenly he jerked violently out of his reverie to stare into the western sky in utter amazement. Despite the fact that he had become somewhat accustomed to the huge cigar-shaped monsters of steel that flew noiselessly through the air, the spectacle that now confronted him was startling in its incongruity. Far on the horizon, and at a snail's pace compared with the passenger ships that occasionally flew by at their customary thousand-mile-an-hour flash, labored a smaller ship of perhaps four hundred feet in length. Behind it, on the end of a heavy line, came a huge object that appeared to be a great building sharply silhouetted against the glowing colors of the setting sun. Addison rubbed his eyes and again stared with incredible astonishment. He turned to the captain, but that officer was wrapped in his own thoughts and took no notice of the unbelievable procession trailing through the sky. Thinking that he might be "seeing things" Addison hesitated.

"Do you see anything unusual in the sky toward the west?" he finally gathered courage to ask.

Captain Gauthier swept the horizon with the intent gaze of long practice and raised an eyebrow slightly in puzzlement.

"No, I see nothing unusual," he said in his soft, beautifully modulated tones. "Why do you ask?"

"Er—it seems to me that I see a building floating in the air. It must be a mirage, or perhaps I am not in the best of physical condition. But it seems unmistakable."

The captain laughed softly. "I beg your pardon. I did not think of your never having seen anything of this sort. That is unmistakably a building, but the sight is so commonplace that I did not get your meaning at first. Just a moment—"

He took a pair of glasses from the rock beside him and examined the approaching train for a time.

"That," restoring the glasses to their case, "is a new science laboratory, built by the Continental Construction Company for the university center on Long Island. It is being delivered by the Consolidated Air Transport Co. I see that tug number 54 is on the job. My sister's fiancé is chief pilot on board that ship. I want you to meet him for he is an energetic young man with a brilliant future. He and I have been chums since we were old enough to play marbles. Just a minute and I'll invite him over for the evening."

The officer opened a door in the huge boulder, which was really an observation post, and took out a continental type telephone into which he spoke after dialing a number. He presently restored the instrument and closed the door.

"He says that he will be free about eight o'clock and to expect him about eight-thirty.

"But back to the building. You see, instead of scattering building material all over the country with its consequent material and social waste, we have a central construction plant located near the source of material. Here buildings are constructed on barges and when the structure is ready for delivery a portable gravity nullifier is lowered into the barge, the gravity is nullified and an air tug makes fast, towing it to any part of the world. It is merely a development toward efficiency."

Addison turned back to regard the strange, almost alarming sight. The train was much nearer by this time and he was amazed at the size and mass of the building. It appeared to be, as near as he could judge, about three blocks long and one block wide. He counted ten stories of concrete, steel and glass. Even as he watched another element projected itself into the scene with terrible swiftness. A ship speared through the clouds and descended upon the approaching tug and barge like an avenging missile

YOU have of course read "The Silent Destroyer." Now the same author comes forward with a sequel to that story. The present effort is every bit as interesting and every bit as absorbing as the first story, and in addition to it, it contains that rare gem, an "O. Henry-like" ending that cannot fail to charm you.

As civilization advances humanity tends to throw off things which our ancestors learned with difficulty. Yet some of these things come in very handy at times. Thus for instance, if you were suddenly marooned on a strange island and had no matches or other means to make a fire, the knowledge of how to make it by rotating a wooden stick and another piece of wood, would come in most handy. Always providing of course, you knew what woods to use, which most of us don't.

"Lost arts" are always interesting and students should not lose sight of them, because one never knows when they may prove valuable.

of destruction; a flash of glaring light that must have been seen for miles and which, even at this distance, carried with it a hint of vast quantities of heat at frightful temperatures—and he could see nothing for a time.

Blinking his eyes, Addison stared with open-mouthed horror at this act of wanton destruction. As though rooted to the ground and paralyzed, he watched the tug, building and barge fall apart and hurtle toward the earth. The entire train had been split from end to end!

The attacker swung back and paused a moment over the falling wreckage and then darted away.

The Maniac's Work

AS the wreck approached the ground the speed of descent became terrific—there came a dull rumble as of distant thunder and the ground shook as with a quake. A cloud of dust arose from the heap of debris and, as if loath to depart, clung to the wreckage until the upper part of the cloud dragged the lower away on the light breeze.

"Come," the captain said quietly when he had recovered from his astonishment and the destroyer had dwindled away to a speck in the sky, "we must bring aid to the men who were not able to jump clear."

Quickly Addison followed the captain through the great boulder that formed the door of the secret underground laboratories and hangars, down the stairs and through the office and factory rooms to the huge cavern where rested the twenty warships. Addison felt small and awed as he regarded these five-hundred-foot monsters of sky-blue metal that towered above him like five-story buildings. Like groups of pigmies, some of them scarcely discernible in the distance, men of the ground crews worked upon this array of battleships of the air. He thought, as the captain touched a button that rang a bell faintly in the vast room, that these workmen must find it difficult to attend to the troubles of these terrible destroyers against which they seemed as impotent nothings.

Twice more the bell sounded and number two ship eased upward slightly and drifted silently and gracefully as a cloud of smoke from the hangar chamber, through the great doors into the take-off chamber where it settled down to wait for them. As they mounted the steps into the elevator room at the bottom near the center of the monster Addison caught a glimpse of the rocks forming the roof. They were split through the center as the ground was being opened to let them out. Inside of the elevator room he saw the flight of steps slide noiselessly between the walls and the door ease shut.

Without taking time to ascend to the control room in the center of the ship, they remained in the elevator room and the captain telephoned orders to the man at the controls. Addison felt the queer sensation as the gravity was nullified and grasped a railing to keep from being flung about the room. He felt pressure against the floor as the ship accelerated on its ascent and the peculiar sensation of being urged toward the ceiling when the upward motion was brought to a stop. He felt the inertia of his body again as they accelerated their forward speed while he listened to the captain giving orders to the head surgeon and to the entire crew. Even as he talked into the telephone the ship touched the ground lightly at the end of the short run, the door opened and the steps slid down. Quickly Addison and the commander descended and stood for a moment to view the wreckage while from several openings in the battleship poured the two hundred men of the personnel.

Addison had first seen the catastrophe as in miniature from a distance, but now he gazed in helpless consternation at this colossal heap of shapeless confusion. There, as though some god had inadvertently stirred up a small city with a huge, relentless spoon, lay a shapeless mass of building material that bristled with bent and twisted steel girders. Scattered far and wide over many acres were fragments, as crumbs from the central mixture, catapulted away by the flailing, tortured beams and girders as they struggled to settle down.

And somewhere the captain's chum was a victim of this tragedy, this murderous atrocity. It seemed impossible that anyone could have fallen with this debris and still be alive.

He looked upward as he attempted to visualize more fully the frightfulness of the whole tragedy and gasped in startled consternation. Like feathers that had been left behind after the denser matter had separated and fallen away, he saw men floating gently toward the ground. Several touched the earth lightly and came hurrying toward the rescue party while others were yet high in the air.

Forgetting, in his curiosity, that his companion must be anxious and troubled concerning his friend, he turned impulsively to him for an explanation but Captain Gauthier was busy issuing orders to the crew. Addison waited.

"And," continued the officer addressing his television and radio operators, "report this outrage to headquarters and let them see the wreck over the televisors. Then order two more battleships out to assist us here as we shall probably be sent out to pursue that maniacal killer."

For a few minutes the captain was not occupied and Addison asked him concerning the men who floated in the air.

"They are using pocket gravity nullifiers. They are an outgrowth of the old type parachute," the commander answered calmly despite his anxiety. "And see, they are using nullifiers to clear away the wreckage."

Addison watched in wonder as he saw men slowly raise huge fragments of debris and when they were clear, shove them aside where they fell to the ground. It appeared as if they were moving weights that were suspended from cranes and that they were struggling to overcome the ponderous inertia rather than working against gravity.

The Captain Explains

"HERE," said the captain indicating a cube of building rock, each dimension of which was about a yard. "Pick up this block."

Addison looked at the officer dubiously but he seemed to be serious as he stood aside and directed what appeared to be a flashlight toward the mass. Addison bent to the task which he was sure must be futile but to his amazement the rock apparently had no weight. He pulled the burden upward, very slowly at first, but with increasing speed as he applied force to overcome the inertia. Thinking, when the rock was waist high, that he would not raise it more he ceased his efforts, but the mass continued upward at uniform speed until it was level with his shoulders when the captain snapped his pocket nullifier off for an instant. The

upward motion of the rock was arrested as by a soft cushion during the instant that gravity was permitted to act upon it, and now it hung motionless in the air except for the gentle breeze that tended to drift it away. Addison pushed against it in a horizontal plane and as it slowly and ponderously gathered headway he had the feeling that if he were to continue exerting force against the mass he could in time accelerate the speed to infinity.

"Now watch out," said the captain when the rock had moved several feet.

Addison stepped aside and the officer snapped off the nullifier. The rock fell to the ground and buried one corner in the soft dust with a jarring thud. The visitor studied it for a moment and turned to the commander.

"When that rock struck the ground considerable energy was dissipated. Surely I did not store up that much energy when I merely overcame the inertia! Where did it come from?"

The captain smiled. "No. When we nullify gravity and raise a mass above its former level we store potential energy just as though the weight had been raised in the old-fashioned way by means of ropes and pullies. Take this wreckage as a better example. They nullified gravity and raised the science building, storing a tremendous amount of potential energy. This energy they rented from a central power plant after leaving deposit of money covering the value of the energy. Under normal circumstances they would have returned the energy, except for a slight loss, as they lowered the building at the point of delivery. In fact, since the building was constructed at a higher point than the point of delivery, they might have returned more energy than they borrowed. Now, however, since the equipment was destroyed in the air, the potential energy was converted into kinetic energy and that, when they struck the earth, dissipated as heat, the original energy had returned to nature and the construction company will lose the guarantee deposit. If it were not for this necessity of supplying potential energy we could nullify gravity, start a mass into the air, and when it was up to some predetermined level, permit gravity to pull it down again with its consequent delverance of power. In other words, we would be getting something for nothing. And that is not in the economy of nature."

"Does it require energy to hold the mass in the air?"

"No. It is only when the mass is raised that energy is borrowed from the central plant. The energy is returned to the plant when the mass is lowered unless gravity is permitted to lower it. In that case, of course, the energy escapes our control."

Addison pondered this for a time. "Suppose," he wondered, "that you nullify gravity without placing the nullified mass in touch with the central power house as a source of energy for potential storage. How would the mass act then?"

"In that case lifting the mass would require just as much effort as though the gravity had not been nullified, this being stored as potential energy. The mass, however, would remain at whatever level you left it when you ceased lifting. Then, to move it in a horizontal plane, all that is required is to overcome the inertia, but so long as no energy is added or taken away in a vertical plane it would remain at that altitude. That is the way we maintain a certain flying level with our airships—merely switch off our connection with the central power house and its ability to take or give energy."

"In other words, your gravity nullifier is merely an insulator against the transformation or transfer of potential energy and to use it practically for easy ascent and descent you add another element to supply or absorb potential energy."

"Exactly. Now you are getting the idea."

"And the nullifiers these men used as parachutes are not connected with the central power plant, so that when they jumped, even if they were coming rapidly toward the earth, they would stop when the potential energy is insulated against change."

"Yes. The potential energy was conserved and they stopped. Had the nullifiers been connected with the power plant or 'sponge' as we sometimes call it, the potential energy would have been returned to the plant as fast as they fell and they would have continued downward at their original speed less the air resistance loss. Had the airship been stationary when they leaped there would have been no downward motion and they would have remained at the original level. Since this condition is rare, a parachute connected with the 'sponge' would be useless."

"Except as a matter of energy economy," Addison supplanted with a twinkle. "But seriously. Suppose you suspend a mass with a nullifier and then suddenly withdraw the potential energy. What would happen?"

The officer smiled. "You are getting into deep water. Of course we have been unable to do that, although the idea is not new. Scientists disagree as to what would happen. Some say that it would disrupt some of the molecular structure, changing enough kinetic energy of the atoms into potential energy to supply the deficit. Others say that the mass would cease to exist —disappear with the energy."

CHAPTER II

A Strange Diagnosis

ADDISON was about to ask more questions when he noticed the captain look past him and give a brief order. He turned to see whom the officer was addressing and started back in amazement. Towering above him, and so close that he could reach out and touch its sky-blue hull rested one of the battleships Captain Gauthier had sent for. It had landed so gently that Addison had not heard it. Near it rested the other and they were disgorging their crews.

It was growing dark and the searchlights of the three ships lighted the scene as though the sun were at work. Air taxis and private ships brought newsmen and investigators to the scene but the captain paid no attention to them for he was watching the rescue work with apprehension. In vain he looked for his chum as each mangled body was carried out. Relatives arrived in their private ships and claimed the shattered remains of what had once been hopes and prides, fathers and brothers. Addison watched Gauthier's face but could detect no hint of rage at the destroyer—only compassion for the families, especially the children who had lost their fathers. It seemed the same in all ages and climes.

He wandered over to watch the surgeons of this age at work over the gruesome remains. He pushed his way through the ring of people who had gathered about the improvised first-aid area and watched the doctors receive each victim as he was carried to them Apparently most of them were dead and this supposition was quickly confirmed by the surgeons whose assistants carried the bodies aside to be identified. An-

other man was carried up and the head surgeon of Number Two battleship bent over him a moment. Quickly he applied electrodes to the body and, with connections through a small box of meters and dials to his own body, the doctor, after three seconds spent in careful adjustments of the dials, and sitting with his back to the injured man, gave orders to the other surgeons.

"Trephine the skull four and three-tenths centimeters above the left auditory orifice for a blood clot due to concussion. Open the abdomen over the appendix, there seem to be ruptured intestines. Four ribs are pulled away from the spine and the left femur is broken in two places."

Addison was still recovering from his amazement at this fusillade of orders when the assistants had disconnected the wire and were well on their way toward the bospital section of one of the lately arrived ships. He wondered what manner of careless surgeon this might be who gave orders of this serious nature without even touching the patient, to say nothing of a careful examination. He became indignant and was on the verge of demanding decent consideration for the unfortunate victim of the crash when Captain Gauthier came up and gravely watched the grisly work. To him Addison poured out his ire, asking that the officer interfere with this careless proceeding. The captain smiled softly.

"That box is what we call a *Diagnostic Type Sense Transmitter*. When those connections are made the pains of the patient are transmitted to the body of the surgeon and he can feel just what the patient feels. To keep from being rendered unconscious by the pain as is the patient, the surgeon varies the intensity of the sensations transmitted to his own person by adjusting one of those dials. Again, if the pain is intense enough to feel quite general, the operator can gradually reduce the intensity until the pain in the sympathetic area falls below the threshold and only the pain from the true injury is perceptible, thereby enabling the operator to locate the true source of pain better than the patient who feels the discomfort over an apparently large area. The instrument is especially valuable in working with unconscious people and with infants. Aside from the diagnostic purposes, the instrument has led to some of the most amazing discoveries in physiology and psychology. The principle was discovered when a scientist was experimenting with the body capacity effect on short-wave radio receiving sets."

Addison looked at the little box with new respect and had an all but overpowering urge to take it apart, but it was again in use on another victim of the disaster and the head surgeon was issuing orders for the most intricate and delicate operation and adjustment.

Despite the scientific wonders and calm efficiency at work over this colossal heap of debris Addison found his mind constantly wandering to the author of the deed. As he viewed this carnage and wanton destruction he wondered what sort of human-shaped animal could perpetrate such a deed and what stimulus had driven him to such measures. He was about to ask the captain to tell him more concerning this outlaw when he noticed an orderly push his way through the crowd, clearing a path for a young woman who followed him closely. The orderly called Captain Gauthier's name and that officer turned just in time to receive the woman who rushed to him.

"Warner! Is he here? Have you seen or heard anything?" Addison heard her ask. The captain's sister, he supposed.

"Not a word, sis," the captain said quietly. "But there is still hope. They haven't cleared away all of the wreckage—and there are a few men who jumped and who haven't yet landed. Perhaps he is still in the air."

"I've had a horrible feeling all day that something terrible was going to happen to him, but I can't believe that he is dead. Say that he isn't, Burke!"

"It doesn't seem possible that he is," the commander soothed. "We'll find him soon, don't worry."

After introducing his sister and Addison, the captain dispatched an orderly to question the survivors of the atrocity. But he could learn nothing.

Something About Hogarloff

TWO more men landed in their nullifier parachutes but neither could reveal anything. And none of the dead was identified as Warner Hale.

Addison saw another man land and noticed that he was wounded. He was quickly placed upon a stretcher and taken to the first-aid area where two surgeons attended him. The captain went over to him and questioned him while the doctors worked. Addison drew nearer and overheard part of the conversation.

He gathered from their talk that the man had been wounded during the attack and because of his faintness had not dared to land until he had recovered somewhat. Yes, he had seen Hale together with the captain of the tug. They had been captured by the destroyer when it paused and had been carried away.

The captain returned to where his sister and Addison waited. His face was clouded with something that appeared to be worry or anger, Addison could not tell which. He assured his sister that Warner had only been captured and that they would attempt to find him. He sent her back to her little ship, ordering one of his men to pilot her back home, and then called in his crew.

"I'd rather that Warner were dead than a prisoner of the madman," he confided to Addison. "I am going after that killer, orders or no orders. Do you wish to accompany us?"

Addison tore his eyes away from the sense transmitter with its tempting insides, and with a reluctant nod followed the officer to the sky craft. They ascended in the elevator to the third floor where they walked down the narrow corridor to the control room. Here, as he strapped himself into the chair, he found his suitcase just as he had left it upon their return from a previous flight of adventure. Lieutenant Evenrude, whose fingers were dancing over the typewriter-like keys of the control mechanism, greeted him with a cheerful nod and again turned his attention to the array of meters, gauges and television screens. Addison again felt the strange sensations that accompany flying in this ship of no gravity and knew that they were under way—he knew not where or to what danger. He was determined to learn more concerning this "mad killer" and why Captain Gauthier had preferred death for Warner rather than capture. But the commander was busy laying out a course and instructing Lieutenant Evenrude. Presently he was free and came over where he pulled himself down into a chair beside that of Addison.

"Who is this 'mad killer' and what stimulates him to such abnormal behavior?" asked the visitor when they were settled.

"His name is Hogarloff. It appears that he was a free-lance student of ancient history until he began

reading some old books of the eighteenth and nineteenth century. As near as I can learn, he became upset by the material in these trashy times and has gone mad with the idea that science is learning too much. He has the absurd notion that the laws of the universe are supposed to remain unknown to man and that man is expected to remain in as much ignorance as possible, conducting himself according to some dogma or other instead of striving to learn in a first-hand way the inner workings of the universe in which he lives. He claims that he is a martyr to the 'cause,' whatever that is, and is striving single-handed to 'save the world from science' as he puts it.

"At first, while he was gathering about himself a little band, we thought nothing of the matter, but when he became violent and contrived to steal a battle plane, the situation became serious. He committed a number of atrocities such as the one you witnessed, but for some time now he has been inactive and we had almost forgotten about him until this new outbreak. He is a fanatic, and like many of his type he possesses a cunning that is nothing short of uncanny. He specializes in raiding science buildings at universities and after each atrocity he vanishes so completely that we have never been able to find a trace of him."

"I can recall instances of fanatical criminals and their elusive ways," said Addison. "What is his stimulus, faith?"

"Nothing so lofty as that. Our psychologists say that this man Hogarloff has no faith but is motivated by a colossal superstitious fear that is even greater than any fear he might have of our attempts to destroy or apprehend him."

At this juncture the television operator handed the commander a photographic film on which was a picture of a yellow sheet of paper carrying a brief typewritten message.

"Orders to pursue the killer," said the officer after glancing at the film. "That will simplify things for us."

"Do you have any idea of where he might be?"

"Not certainly. I have been wondering about that too and have developed a theory of my own. I am now acting upon the idea that he dives his ship into the ocean and hides under the ice somewhere along the edge of the polar ice cap. But of course it is only a theory."

"What! These airships travel under water?"

"Oh yes. But we seldom take them under since the speed is reduced to less than seventy miles an hour, and there is no object except for hiding as in the case of this madman."

"Then how are you going to locate him?"

"We may not locate him, but we will attempt the job with an electronic stream. It is a new invention brought out with this very purpose in mind. Ours is the only ship, so far as we know, that is equipped with one and this is the first opportunity we have had to try it since these crimes began. We ionize the air for great distances with a parallel beam ray and pass a current over the beam. When this beam strikes another ship connected with the central power plant we notice a disturbance in the electrical circuit composed of the two ships, the power house and the ionized beam. That gives us the direction of the ship, and the measure of dissipation of the current together with the resistance gives us the distance. We have a special meter that interprets these two elements in terms of miles and is direct reading. Already the operator has picked up a number of ships but they are all legitimate freight and passenger liners, as we ascertained by radio and television."

"But isn't there danger that he might attack us?"

"Grave danger. But his capture is worth several ships and their crews. We are keeping a double watch to prevent a surprise attack. I imagine that he is flying without lights and that makes the danger more acute than ever, for a ship carrying searchlights can often be located, even if the lights are infra-red or ultra-violet, before the ship itself is visible. On the other hand, he is so wary that he may not attack a warship unless he is cornered."

Sins and Errors

ADDISON pondered this with some misgivings. To think that they pitted against a cunning maniac equipped as well as they. And Captain Gauthier, with his soft, well-modulated voice and supreme calm, was after the social renegade with a fatalistic determination that recognized no danger or obstacle great enough to turn him aside. Addison began to feel that powerful undercurrent of determination now as he thought of the commander's remark to the effect that the capture of the outlaw was worth the price of several ships and their crews. What manner of civilization was this new scientific order! Yet there was no hint of a feeling of sacrifice—everything was done as a matter of accepted duty. They acted automatically as part of their system.

"As there is no immediate danger of attack, suppose we go to the recreation room," the captain suggested. "I wish to look up the man's history now that we are after him. A clear picture of his habits may be of value in capturing him. While I am doing that you might be interested in seeing a picture show or two."

Wondering what sort of picture show they might have on board this ship, Addison followed as best he could in this space of no gravity. His magnetic shoes clung with considerable tenacity to the carpet covered steel floor, but when he pulled a shoe away from the steel the magnetic attraction became practically nil. It was an absurdly queer sensation and he thought that he never would become accustomed to walking about. With many grotesque contortions he managed to sprawl after the captain as he went down the corridor and into a small auditorium.

"The educational department sent us two hundred new photoplays just before we left and I am eager to see some of them," the officer remarked as he placed a spool of wire in a small machine. After threading the contrivance he turned off the lights and started the projector. The screen was illuminated by a maze of flickering spots of all colors until the captain, after several adjustments, "framed" the picture when it smoothed out into a clear, perfectly steady series of images. And the machine was so nearly silent that Addison marveled, wondering what kind of intermittent sprocket was built into it. They read the title, cast and other preliminaries and then the picture itself flooded the screen in beautifully natural colors while in the background hovered soft strains of wonderful music that blended into the picture with such perfection that Addison closed his eyes a moment to make sure that it was not his imagination.

As the drama progressed the captain explained some of the elements that might puzzle a person of the twentieth century. The main plot thread, interwoven as it was by subsidiary complications, was that of a young man in love with the "sweetest girl in the world." But

the *aura* colors of the man were not clear and bright compared with those of the woman.

"Every person," Gauthier explained, "is surrounded by an *aura*. During the twentieth century, yes, and even centuries before, this was known, but we have, through our highly developed photography, found that the colors of the *aura* furnish a key to the mental and moral development of the individual. In this picture you will notice that the colors of the man are clouded, indicating that certain forces within his grasp are not fully under his control, while those of the woman are very much brighter. We classify people in that way."

"Do you use this *aura* classification for formulating laws to prevent the making of mistakes in marriage?"

"No. Ours is not a civilization of enforced laws. We realize that we are here for knowledge and that the only possible way for the human being to gain knowledge is through experience. Therefore we believe, as a man of the steel age, one Henry Ford, said, 'I never make a mistake.' Of course, we see people continually making what we call mistakes, but to the man making the so-called mistake it is not, to his consciousness, an error until the violated natural laws turn upon him with their inevitable reaction. Even then he realizes that he has not made a mistake but merely placed himself in a position to find and experience some heretofore unobserved law for his store of understanding."

CHAPTER III
A Modern Movie

THE television operator interrupted by entering the room and giving the officer a long typed report together with several pictures he had made by photographing the television screen. Captain Gauthier read the report aloud for Addison's benefit. About the time that Number Two warship had left the scene of the wreck Hogarloff had attacked and destroyed the large science laboratory at Cairo, Ohio, killing hundreds of students and reducing the building to a hopeless ruin. The military departments of the Occidental and Oriental governments were rushing anti-aircraft equipment to all university centers and preparing to defend the institutions against further attack. Captain Gauthier was ordered to bend every means toward the destruction of the scientific enemy of science. The report added that the destroyer was seen flying northeast after the atrocity. The other photographs were views of the ruins showing the wild havoc wrought during the few seconds of the attack. Addison felt his blood boil but he quickly calmed himself. Who, associated with this carefully schooled officer, could permit his emotions to run wild?

The captain telephoned to the control room, ordering Lieutenant Evenrude to reduce speed and to the ionic ray operator to feel about for the enemy as he might be expected to approach from the southwest.

"What will be done with this madman in the event that he is captured?"

"This enemy of science will be placed in a psychopathic hospital where science will do its best to assist his mental feet to firm ground. But the possibility of capturing him is remote if we are to judge by past experience."

Addison considered this as he watched the picture, and wondered if it could be possible that this determined military officer of the scientific civilization could be thwarted. Surely the madman must be a genius to elicit such doubts from Captain Gauthier. They were now, in the course of the picture, presented with a court-room scene. He became intensely interested in the fact that the judge and each of the jury was supplied with a pair of electrodes as was the accused.

"Why the wiring?"

"That is another application of the sense transmitter. The judge and jurymen are enabled through its use to experience all of the emotions and thoughts of the defendant and are thus enabled to judge accurately as to the disposition of the case. Most of our criminals are sent to the psychopathic hospital for treatment, since most of the crimes committed are the result of some psychic abnormality."

Several more pictures were run and Addison noticed that the struggles were not of a physical nature but were designed to bring out the laws of mental and emotional activity and their application to everyday life.

At last the officer turned on the lights and the visitor sat for a time gathering together the ideas he had seen dramatized. Suddenly he recalled a question he had intended to ask.

"How does your moving picture projector operate?"

"Very simply. You can imagine that when we discovered the means of nullifying gravity the methods by which magnetic lines of force can be insulated and focused came as a natural after-thought. We take two small quantities of magnetic insulation, which, by the way, is nothing but material from whose atoms the kinetic energy has been withdrawn, and grind them together until the joint approaches perfection. This joint leaves a very thin space where the magnetic lines of force are not insulated. By moving a wire of special steel alloy that has peculiar magnetic characteristics through a hole in the blocks perpendicular to the plane of the joint and influencing the wire with a series of magnetic impulses through the joint we magnetize the wire transversely into a succession of atomically thin discs.

"The intensity of the magnetic discs is an interpretation of the intensity of the light upon which the pick-up was focused at the instant. In the projector we use a similar arrangement and the impulses from the magnetic discs are picked up through a joint between blocks of insulation and interpreted in light, being cast upon the screen as spots of light of varying intensity by a mechanism similar to our television apparatus. By diffusing slightly we get rid of the spotted effect and by using three wires, one for each primary color, we get the natural colors. A fourth wire furnishes the music. In the manufacture of the wire, we draw all four wires at once and leave a fine connecting web between. In that way we keep everything synchronized."

"Then you have disconnected the use of celluloid film entirely?"

"It is a singular fact that all great discoveries trail along in the wake of the new and never outlive their usefulness. We print our books on celluloid film, constituting one of our two main types of books. Here—"

The captain produced a small box and a spool of quarter-inch wide film from a compartment in the wall and, after plugging a lamp cord from the box into a convenient receptacle, he threaded the film and turned on the light. On a screen appeared the title page of a book, revealing to them that it was the history of the atrocities committed by the man Hogarloff. By pressing a button he brought the next page to view.

Addison touched the screen and was astonished to find it made of ground glass, although he could see nothing but the focal plane. He turned to the officer with a question.

"That is a special glass with an index of refraction exactly equal to that of air. It's easier to read from than if it were ordinary glass."

Addison read several pages in horrified fascination, for the atrocities indulged in by the madman Hogarloff were not what could, even by stretching the imagination to the limit, be compared with a pink-tea affair. At length he gave it up with a shudder, but the officer continued reading for a time.

"I wish to familiarize myself with some of his habits, now that we are after him," the commander apologized.

He read on with amazing rapidity, seeming to gather at a glance all of the ideas presented on an entire page. In a trifle over ten minutes he had read the entire book of two hundred and seven pages.

"We teach reading in that manner," he said in answer to Addison's question. "Instead of grasping a word at a glance we read a whole line at a glance, and from there it is but a step to the reading of a whole page in one or two seconds."

"But isn't there danger of burning the film with a light powerful enough to enlarge the tiny image to the size of the screen?"

"We use cold light emitted by a short-wave radio transmitter. Within limits there is no danger."

"Within limits?"

"Yes. We tried the experiment and found that the thermometer upon which the light was focussed did not indicate the slightest thermal change until a certain light intensity was reached when the thermometer disappeared with a flash of light and frightful amount of heat—the molecules were disrupted. We experimented and found the wavelength best suited for commercial disrupters and it happens to be such as not to affect the visual nerves. We use disrupters for a number of purposes including the cutting of materials in our shops and factories. It was with a large, military type disrupter that Hogarloff cut up and wrecked the science building."

Addison made some mental calculations.

"You spoke of other types of books," he said presently.

"Some people like to be read to, so an expert reader records an edition of each book on steel wires similar to the moving picture wire except that only one strand is used. In other words, it is a phonic record of the book."

Last Instructions

FOR a time they listed to a book, but eventually the captain glanced at his watch and arose.

"We are nearing our objective so I'd better go back to the control room. Even now we are in danger."

Addison thought with a shudder of the things he had read about the enemy of science and staggered after the captain as he attempted to simulate walking in this space of no gravity. On the way down the corridor the captain stopped in at the ordinance department and drew out a small pocket nullifier of the parachute type and instructed Addison in its use.

"This nullifier is not connected with the 'sponge' as it is to be used as a parachute in event of disaster. All that is necessary is to press the switch as in the case of the old-fashioned flashlight and it will nullify gravity, leaving you suspended in the air since the potential energy cannot escape. Should the plane be damaged to the extent that it is necessary for us to abandon her the siren will automatically give the alarm."

In the control room Addison noticed that the gunner was at the gun control table and that the television screens used for viewing the surrounding—for the control room was deep in the center of the craft for its better protection—had changed color. Addison knew from this that the searchlights had been adjusted to ultra-violet in the hope that the enemy was not equipped to pick up and interpret those short waves. The captain punched out data on his computing machine to ascertain their location which he compared with a map. A touch of a button and Addison heard the faint tinkle of a bell calling this silence-loving crew to battle stations.

The visitor watched these preparations with growing apprehension as he recalled the deliberate, malicious destruction of the science building.

Presently the electronic stream operator arose from his table near those of the radio and television operators and reported to the captain.

"I picked up a ship which refuses to answer our radio calls. According to the direction finder and dissipation meter she is two points west of our course and seven hundred thirty-one miles away."

"We'll investigate. Keep her in the electronic stream and watch the distance carefully. Lieutenant Evenrude," he addressed the man at the controls, "shift the course two points to the west, and full speed ahead."

Addison felt a slight motion as the adjustment of the gyroscopic helmsman was changed and the great ship swung onto her new course. He felt pressure against the chair as the speed was accelerated. He looked at the marvelous clock which indicated the exact local time of any spot on the earth's surface over which they happened to be at the moment and saw that it was turning backward, showing that they were literally catching up with time. A glance at the earth speed indicator told why—they were rushing silently through the air at nearly two thousand miles an hour.

Again the electronic ray operator reported.

"They neutralized my ray and when I attempted to trick them by turning on several they neutralized these. They have an ionic ray apparatus of their own and an expert operator. I can keep their direction but he balances any changes I make before I can get a reading on the distance meter."

"Hang onto them as best you can. There is no doubt that they should be boarded and examined even if they are not the maniac and his crew. I wonder how they happen to have an ionic ray equipment when ours should be the only one!"

The commander gave further orders and the crew scattered to a triple watch. Everything was tested and made doubly ready for battle. A silence, an ominous silence, settled over the ship.

Addison became apprehensive of the future and by way of preparation he took the parachute nullifier from his pocket and examined it. It appeared to be some sort of flashlight, evidently emitting a ray that insulated the potential energy against dissipation. He pressed the switch as an experiment and found himself become suddenly very heavy. Startled, he switched it off. Gradually his fright gave way to astonishment and he wondered how they could consider this object a parachute when it made him feel so heavy!

Evenrude, who had been watching his dials, looked around at him and then shook his head vigorously,

motioning him to come over to the control board.

Resuming his vigilance, Evenrude waited until the visitor had strapped himself into a chair between the ship's and the gunner's control tables.

"You must not turn on your parachute while you are on board the ship," he cautioned. "We are ascending at present and are drawing potential energy from the central power station but when you turn on that 'chute you insulate us to some extent and yourself completely. You probably were startled to find yourself become very heavy. That was because the 'chute insulated you against the inflow of potential energy and left an apparent plane of gravity at the level at which you turned it on. The ship was then lifting you away from this plane of gravity and thus supplying the potential energy necessary for the elevation of your position. Hence the feeling of great weight. So carefully is the ship balanced that you seriously disturbed its flight. The potential energy inflow meter and the rate of climb meter became erratic the moment you turned on the 'chute and I was puzzled for a moment until I happened to think that someone was experimenting with a potential energy insulator. I immediately discounted the crew, leaving you as the one most logically guilty."

"Guilty," confessed the visitor. "You are quite a detective. But if the parachute makes me heavy when I turn it on, how am I to trust the thing if I should have to jump into space. It seemed to me that I was heavier than I normally am while I am walking about on the surface of the earth."

"You were heavier," Lieutenant Evenrude confirmed Addison's astonishing discovery. "But you see, we were accelerating upward and the enertia together with the storing of potential energy was like an elevator just starting—"

CHAPTER IV
Battle!

BUT Lieutenant Evenrude never finished the sentence. He became suddenly alert and fixed his attention upon one of the television screens and spoke an order to the gunner. Addison looked at the screen just in time to see a huge shape flash out of the field of view—a ship like their own. For only an instant was the other visible, for they had met and passed at full speed, their relative motion being something near four thousand miles an hour.

Evenrude switched off the gyroscopic helmsman and closed the connection with the "sponge" and took over full control for battle maneuvers. The ship lost speed and swung about as the visitor ascertained from his being forced this way and that in his chair. Something was wrong, he felt sure, although the officers appeared to carry on as though nothing were amiss.

Presently a man entered and reported.

"That ship cut off about a hundred tons of mass from the stern on the port side and carried away two of the propeller tubes. Sixteen men are missing."

He departed and the captain turned calmly back to the control operators.

"She's losing headway," said Evenrude. "She won't do over seven hundred. What are your orders?"

"Attack," said the captain quietly. "That is, if he doesn't run away This is too good and rare an opportunity to miss. We are the only ones who have ever encountered him in this way."

"How did they cut off a part of our ship?" gasped Addison in amazement. "And without our knowing it!"

"They cut it off with a molecule disrupter, as I explained when we were talking about cold light. We too are equipped with them and sight them by means of the several cross hairs on the television screens. When the enemy image is over an intersection of any pair of lines he is in range of one of our disrupters."

The captain was watching the screens and dials as he spoke and his tones were those of one who is absent-minded. Addison decided not to ask more questions at this critical time for a feeling of guilt had begun to steal over him. Would they have been injured if he had not been detracting Lieutenant Evenrude's attention? He thought not and began to squirm with a guilty conscience. He felt an uneasy and persistent forebody of disaster and again examined the parachute nullifier. But he analyzed the situation with the complete reassurance of a condemned man feeling along the keen edge of the waiting guillotine.

"A parachute nullifier. And it made me heavier!"

Ousting these disconcerting thoughts from his mind he again turned his attention to the television screens. They were now flying due east and the local time clock was turning ahead at nearly twice the normal speed of a clock. He looked at the altimeter—fifteen miles, it read.

As they slid through the air, the screens connected with the pick-up plate in the nose of the ship began to brighten and a light different from the color of the searchlights spread over and grew upon the ground glass. Dawn.

Gradually, as it became lighter, Addison could make out the dim outlines of the ground below as through a thick mist. The searchlights covered only a small spot, but now he could see over considerable territory. It appeared, as best he could make out, that they were above a coast line of some continent and that the part of the ocean to the north was covered with snow and ice.

Suddenly the captain pointed to a tiny speck on the screen and near the ragged edge of the ice. Lieutenant Evenrude nodded and touched several controls. Addison watched the scene leave the one screen and reappear on the one connected with the pick-up plate in the nose of the ship. Then he realized that they were diving straight down. He looked at the earth speed indicator to find it at zero. The air speed indicator, however, was stuck over in the corner against the pin. For several seconds this frightful speed continued. The picture on the screen grew larger and clearer with amazing rapidity, the innermost objects crowding those along the edge out of the field of view as they grew. The speck grew into the image of the enemy ship. As they neared the ground he felt thrown against the straps and knew that the speed of the ship was being reduced rapidly. The enemy ship grew larger and Evenrude spoke to the gunner. Addison watched in fascination as the pilot maneuvered to get the madman's ship on one of the cross hairs. Unsteadily the enemy ship crept toward one of the intersections as Evenrude slowly swung the great ship out of its downward plunge while Addison held his breath. The captain watched quietly.

"They have the advantage of us in speed now," he spoke to the gunner, "so be careful and finish them the first shot or we'll have our hands full.

Again the breathless waiting. Suddenly the gunner touched a button and the screen was illuminated by a blinding flash that left Addison's sight a swimming pool of billowing after-image. He blinked and looked back, but their ship had leveled off and he looked to

another screen where he found the enemy circling and diving frantically to get out of the way. He examined it more closely and was amazed to find that the nose of their enemy was strangely missing. In his astonishment he forgot his resolve and another question burst out with spontaneous abruptness.

"What happened to them?"

"We cut off a section of the prow with a molecule disrupter. When the molecules are disrupted the kinetic energy of the atoms is given up as heat and light," the captain said absently.

There followed a battle of science and wits that lasted for twenty minutes. The ships lurched and rolled as they strove to keep out of each other's range and yet rush in with a lucky shot. Handicapped as his ship was, Captain Gauthier drove into the fight with a calm that was amazing. The enemy circled them warily, evidently realizing their difficulty, but the warship maneuvered with such skill that he dared not rush in. But it could not go on.

Abandon Ship!

THE enemy, with her superior speed, mounted to a great altitude. Addison watched the screen as the madman's craft all but disappeared in the hazy sky. He breathed with relief at this apparent retreat, but the breath stuck in his throat when he saw the maniac nose over and dive at them at frightful speed. Addison could scarcely keep track of the image that flitted across screen after screen as it rushed by and was gone. Even as it went by he saw one of the screens go dark and wondered what had happened. A man entered and reported quietly.

"They cut off a slice from the top near the bow. We have a blind spot."

A fatalistic sense of tragedy closed over Addison. It was as if he were in a dentist's chair and that tender molar part way out. One or two more excruciating pulls and all would be over. And there was no turning back now.

Again the ships maneuvered. The enemy redoubled his efforts and fought furiously to end the conflict as soon as possible. Yet, although the warship was hopelessly on the defensive, he was wary, knowing that one mistake might be his last. Like a hungry wolf trying to rush in and kill a staggering, wounded steer, yet realizing that one toss of those desperate horns might disembowel him, he circled and parried, striving to approach the blind spot of his tormented victim. And Evenrude worked over his controls to keep the blind spot out of danger and catch the enemy on a cross-hair intersection when one of Hogarloff's (he was sure now that it was his) thrusts carried his murderous ship within range of the warship's disrupters.

Addison watched all of these movements with growing apprehension. He saw the enemy again mount into the sky and gripped his chair arms in suspense.

"Watch him!" the captain broke the silence. "It is one or the other of us this time."

Addison saw the enemy, a mere speck now, point the nose of his ship straight at them and grow in size with startling rapidity. He scarcely breathed as he watched Evenrude's fingers dart over the keys in an effort to keep the blind spot out of danger. The enemy was almost within range and he noticed the gunner tense slightly over his controls. A fraction of a second and all would be over. The killer was now on a cross-hair intersection and just coming into range. Addison stopped breathing as he watched the enemy approach. He saw the gunner touch a button. He tensed himself for the flash, but there was no answering blaze of light. Then he saw the reason. Just as they came within range the enemy swerved sharply and disappeared from the television screen. For an instant the killer was on their blind spot while Evenrude strove desperately to swing his ship around. Crippled as she was, however, he could not maneuver quickly enough.

The ship trembled slightly and the automatic siren burst into life.

"Abandon ship," the captain ordered calmly. "You stay close to me Mr. Addison."

Frantically and yet with relief that the suspense was over and that the frightful disrupter had missed the control room Addison unbuckled the straps and freed himself from the chair. He staggered toward the door and then noticed his suitcase strapped to a chair near the entrance. As he went by he gave the case a vicious jerk that broke the handle and freed it. With this under his arm he burst through the door that led to the corridor with the idea of hurrying to the elevator. He gasped and clutched frantically for support but too late. Where the corridor had been there was now nothing but empty space with the earth far below. In his desperate struggle to get back to the ship he dropped his suitcase but it remained beside him in space as though he had placed it on a shelf. Addison seemed to remain stationary, the air rushing by him, the half of the ship from which he had leaped seemed to draw slowly away from him. But they remained at the same altitude. Apparently gravity was still nullified although that did not seem reasonable. He tried, with the desperation of a drowning man to swim back to the ship but to no avail. After a few strokes he lay panting and gasping at the thin air. He looked around. On one side was the half of the ship from which he had leaped and on the other side the other half. The enemy had cut their ship in two from end to end

Except for the rushing air, to Addison it seemed that the two sections of the ship were at rest, he was at rest, his suitcase was at rest—everything was at rest. It all happened in clipped seconds but the maze of crowded impressions that raced through his mind made it seem minutes. He saw the captain who had leaped from the doorway gradually draw close to him. Then he saw an amazing thing. Others of the crew leaped into space and then seemed to rush upward with extraordinary speed, quickly becoming mere specks far above him.

"I'll take care of your suitcase," said the captain when he finally drew close to the visitor and clutched the broken handle of the case. "Hang onto my arm and then turn on your nullifier at the same time that I do."

Addison reached into his pocket and drew out the little device that had made him heavier while on board the ship.

"But there is no gravity here and everything is resting so quietly," he objected.

"Look at the ground," said the captain with a smile.

Adrift

ADDISON looked down and gasped in horror. The earth was rushing toward them at frightful speed. The horrible fascination one feels when standing on a railroad track before the enlarging train roaring down the track assailed him and left him powerless to do anything but stare. As from a distance he heard the captain count "one—two—three." With a great effort

of will he tore his gaze away from the enlarging hills and rocks below and snapped on the little 'chute. He saw the parts of the ship and it seemed to him that he and the officer were going upward—slowly at first, but gradually faster and faster. He looked down and noticed that the earth was coming at them with everlessening speed, while the two sections of the airship were quickly becoming smaller and smaller in the distance. Even as he watched he saw them, as in miniature, strike the ground and bounce. There was a shower of debris that gradually settled and all was at rest. Presently there came to them a dull thunder and the air trembled slightly.

Again Addison looked at the earth and was amazed to see it draw away from them. He turned to the officer for answers

"You failed to turn on your nullifier and became a freely falling body. When you leaped clear of the doomed ship you and the two sections were falling at the same speed so there was no relative motion between you and the wreckage since you were all going in the same direction. Had you continued it was the motion relative to the earth that would have been important. When we turned on the nullifiers we insulated the potential energy against change and then our speed gradually lessened until we came to a stop and started back up."

"Back up! Why?"

"When we insulated the potential energy it was the same as establishing a new center of gravity."

Addison was so interested in this explanation that he shivered without knowing why. Suddenly he came out of his abstract mood and realized that it was very cold.

"We better get down and start a fire before we freeze to death."

"Turn off your nullifier at the same time that I do and we'll descend a short distance and then turn them on again at the same time. If we turn them on and off simultaneously we can keep together and I'll show you just how far to go at each drop as we near the ground. One—two—three."

Again the horrible fascination of the earth rushing at him that made of his mind a single and very deep track gave Addison all he could do to tear his thoughts away. He kept his eyes upon his companion and was able to think of his own volition again.

"One—two—three," the nullifiers were turned on and the speed of descent gradually lessened until they came to a stop and were on the verge of ascending when the nullifiers were again turned off and the earth again started its apparent rush upward.

Addison was nearly frozen. After several more "steps" downward he despaired of ever reaching the earth alive. He longed to let himself go in sleep, yet he knew that to give in to this feeling of delicious drowsiness would be fatal. His reason told him to go down in great jumps, yet the rush of cold air through his clothes made him hesitate and the longing desire to sleep was gradually overpowering his reason. He looked at the captain only to find that he too was struggling desperately to keep awake.

Their nullifiers were turned on and they were at the point in their pendulum swing where they were motionless and on the verge of turning upward. The desire to sleep was now irresistible. The pain of the cold was now gone and Addison felt strangely warm and comfortable, but oh, so drowsy! Vaguely he felt the captain slapping his face and hands in an effort to rouse him but this wonderful comfort and warmth was too enticing to leave for the cold outside—he refused to leave it.

As through a heavy blanket of warmth and comfort he heard strange voices and felt vague, shadowy hands grasp him. With a desperate effort, as in a nightmare, although this was a pleasant one, he roused himself to protest against this disturbance. Vaguely he saw the confused outlines of a huge airship beside him and understood that he was being taken aboard. Again he lapsed into the utter comfort of lazy sleep.

CHAPTER IV

Captured!

WHEN Addison came to, the captain and several members of the crew of warship Number Two were working over him. With a groan of agony, he wondered why they hadn't let him rest in warm comfort instead of bringing all this excruciating pain upon him. Gradually the pain became less intense and his mind cleared somewhat. He realized in a listless way that he had been near death. He opened his eyes again and looked about with mild curiosity.

"Where are we—what happened?"

"Lie back until we get you rubbed down thoroughly," ordered Captain Gauthier. "We were picked out of the air by Hogarloff and are in his vessel which is under the edge of the polar ice cap."

Addison lay back, and while the survivors of the battle rubbed life back into his tortured body, he gathered together the tangled threads of his memory until he had a clear picture of what had happened. With a vague question as to where his mind and memory had been while he was practically dead and how he was able to assemble them again, he sat up and looked around with restored interest.

They were in a large room, the door of which was covered with an iron grate. They were prisoners beyond a doubt. He noticed that there were about a hundred and twenty-five men present. Evidently nearly half of the crew had been lost.

"Now what?" he asked.

"Plenty, I imagine," the captain grimaced. "I am sorry that we have you along on this trip."

The captain wandered off by himself and Addison mulled this over with a mind that still was a little confused. The last statement of the calm officer was typical of him yet spoke volumes concerning the seriousness of their position. This admission from the commander led Addison to review some of the things he had read about the maniac and he realized that their dilemma was not one to elicit envy. He stood among the other men, rubbing his frostbitten fingers and wondering what the future might hold for them when he heard a conversation at the door.

"Disregarding, as you so obviously do, the fact that you have no right to hold us prisoners, what do you expect to do with us now that we are helpless?" came the easy, resonant voice of the captain.

The other voice carried a hint of the fanatical and was comparatively harsh.

"We are saving the world from science, and in your ignorance you may not know, but the end justifies the means. We have adopted and adapted the methods used by our illustrious forebears, which, although they are not altogether pleasant, are very effective in that they are entirely automatic. It is like a threshing machine separating the grain from the chaff except that if it doesn't bring out good grain it kills."

With visions of the rack and other specialties in torture Addison shoved his way through the crowd to the door. He expected to find a brutal looking man with a horrid leer of cruelty, but he was dumbfounded to see that the man called Hogarloff was a long-faced individual with a long, flowing grey beard and eyes that glowed. While he talked he rolled his marble-like eyes upward as though he were looking for something on the upper strip of the door jamb.

The queer commander of this ship of queer destinies walked sanctimoniously away and the prisoners broke up into little scattered groups. Addison and the captain remained near the grated door as if loath to give up hope.

Now, for the first time, Addison noticed that two of the men, one quite young and the other of middle age, lay near the wall opposite the door. They had been made comfortable on coats and other garments spread to form a bed. He was astonished to see that their legs were bound up in splints, evidently broken, and that they seemed to be unconscious.

"What are they and were they injured in the fight?"

"The younger man is my sister's fiancé, Warner Hale, and the other is the captain of the destroyed tug. They have been put through the first degree of Hogarloff's conversion methods but we have set their bones and they will be all right if we can get them out. Now you understand why I wished that they had been killed rather than captured."

Addison went over to them and found that their legs had been deliberately broken and that they had been tortured until they were unconscious and then left, evidently to recover somewhat and think it over. For the second time rage possessed him and his blood boiled. Then he thought of himself and his fellow prisoners. The fact that this method of changing the ideas of a victim was ridiculous did not lessen their danger.

"If we only had a pocket disrupter. We could cut out this door in no time. But of course they disarmed us." The captain was almost gloomy.

"Suppose we pretend that we are 'saved from science' until a means of escape presents itself?"

"We couldn't. He'll photograph our auras and one glance will show him our true colors."

Addison had not though of this unerring method of diagnosing character. It seemed hopeless. Slowly the minutes dragged by with reluctance, each striving to linger its full quota of sixty miserable seconds that it might taunt the luckless crew to added misery.

An Ancient Contrivance

AND with each eternally long hour Addison wished more desperately that he had remained at the scene of the science building wreck and obtained permission to look into the sense transmitter mechanism. Eventually he ceased wishing and settled down to accept his fate as the others were doing. As he sat on the floor another hour slowly dragged its crippled carcass into the past.

Finally a group of men near the left rear corner of the room broke up and filtered away among the scattered groups. It was Addison who, despite the fact that he was a guest of this future civilization, first cast off his cloak of gloom and brought to the near-survivors a ray of diversion. Quickly he arose from his position near the door and hurried to the opposite end of the brig where he had spied his suitcase, heretofore hidden by the group of men. With painfully frostbitten fingers driven to haste by diverse emotions he fumbled the straps and catches open and revealed to the apathetic interest of the crew what appeared to be a small collection of junk. He selected a piece of crooked metal equipped with a handle at one extremity, and when he began fitting to the frame a thin strip of metal with a jagged edge, the less dazed of the men lolled closer and carried with them some semblance of curiosity. None of these silence-loving men ventured any questions or comments, even while their guest tightened up the wingnut at the extremity opposite the handle of his twisted bar of metal. Their eyes followed him with slightly growing curiosity when he picked up several more thin strips of metal with ragged edges and moved toward the grate covering the one opening of ingress and, they dared not hope, egress. They watched him as he peeked out to assure himself that they were alone, and then as he bent and applied the jagged strip of metal to one of the bars at a carefully chosen spot. Quickly he drew the contrivance back and forth across the bar and the tortured metal emitted grates and squeals that tortured the sensitive ears of the tortured men. They clamped their hands over their ears and otherwise showed their displeasure, but Captain Gauthier, his curiosity overcoming his agony, approached the industrious guest with a question.

"I'm sawing the bar in two. If you'll get several men to grasp the bar it will deaden the vibrations so that our captors cannot hear us. We'll be out of here in a short time."

The commander gave the order and strong hands grasped the bar to deaden its vibrations in a fleshy pad. Addison spit on the blade to lubricate it and again bent to his work. After what seemed ages to the men of this efficient civilization but which, to Addison, was a normal mild steel job, they saw that the strip of metal was slowly eating its way through the grate bar. It was halfway through and they began to see a ray of hope. He substituted a new strip of jagged-edged metal and continued with his work until the bar was severed, while the crew, who regarded this work as we might the making of fire by rubbing two sticks together, and some of whom vaguely recalled having read of the hacksaw in ancient history, marvelled that they had actually seen the primitive method used.

A member of the crew with more bovine dimensions and instincts grasped the bar and bent it down and out of the way, leaving an opening through which the captives squeezed sideways. At last they were all assembled in the narrow corridor and the captain took command.

Five men were selected to act as scouts. They crept along the corridor to the ordnance room where they overpowered the clerk and quickly armed their comrades with pocket disrupters. The commander broke up the crew into squads and these groups scattered throughout the ship and quickly, after several isolated fights and three casualties, took over control of the ship. The madman and his crew of world savers were disarmed and herded into the brig after the master mechanic had reinforced the grate with new bars welded in place with a ray welder he found in the machine shop near the bottom of the ship. Fearing that the captives might have a sharp bit of flint with which they might succeed in gnawing through the bars, the captain stationed a guard at the door of the brig and scattered his crew to their stations.

(*Concluded on page* 367)

AROUND THE WORLD IN 24 HOURS

by R.H. Romans

He ended by dropping his plane toward the crowd, checking its fall at an altitude of one hundred feet and remaining suspended in the air. He then stepped to a lower altitude, held the plane motionless and addressed the crowd.

AROUND THE WORLD IN 24 HOURS

IT was a busy day during a busy season and Prosperity has been smiling with a golden smile. Dewey Burns and his assistant bookies were reaping a rich harvest from the suckers who thought they could guess which horse would come in first

"Say Dewey, what is a Minute Man?" Joe Murphy asked.

"I dunno; ain't it the name of a horse?"

"It might be, but I never heard of such a pony."

"Aw ya dummies!" Mike Brodie interrupted. "Doncha know that a Minute Man is the name of an automobile? Where ya been for the last six years?"

"I guess that's right, but did you ever hear of an airplane by that name?"

"No. Did you?"

"I heard about one today. You know that farmer who was in here this morning with five grand to lay on a pony's nose? Well, he was back this afternoon and called his bets off. He said he was goin' to bet on a sure thing."

"What's he bettin' on?"

"On nothing! He's bettin' against the Minute Man"

"He is? That makes four big suckers that got away with that line today. Our business will be shot if we don't get the low down on this Minute Man."

"Well I'm the boy who can give it to you. It just cost me ten bucks to learn all about it from that five thousand dollar sucker that got away."

"What did he tell you?"

"Nothin'. He just gave me a copy of an Akron paper and told me to read it myself."

"Where is that paper?"

"Right here, Dewey; ten dollars please."

"Ten dollars! Where do ya get that stuff? We're partners ain't we?"

"Sure thing, if you pay your share of my original investment. That paper cost me ten bucks. Hand me five if you want to see it."

Dewey reluctantly handed Joe five dollars and soon became very much absorbed in a front page news item:

"Minute Man to fly around the world in twenty-four hours. Inventor of new type plane expects to set a new record."

"Fulton Field, Akron, Ohio.—The world is due for another big thrill. Olaf Hansen, from somewhere in Minnesota, has invented an airplane that will break all records in speed and long distance flying, so he claims. He refuses to reveal the location of his mysterious plane, which he calls 'The Minute Man.' Flyers at the Municipal Airport were favored with a description and photographs of this wonderful plane, but they do not seem to share Mr. Hansen's enthusiasm.

"From the inventor's description, the plane is made from such material as was available. The motor was taken bodily from a 1930 Ford Coupe—'The fastest little Ford in Minnesota'—Mr. Hansen claims. The wings are made of canvas, stretched over a light metal frame—'So they can fold up like a bird's wings'—a novel and handy feature. The gasoline tank has a capacity of ten gallons. The inventor thinks that is quite enough, because 'That motor can run all day on five gallons' and Olaf does not believe in having too much weight.

R. H. ROMANS

"Other remarkable features include a 'Built-in lunch-box', which is bigger than the gasoline tank, showing that the aviator expects to use more fuel than the plane.

"Another box contains dry-cell batteries to work the headlights since the motor is minus a generator. The cock-pit is full of the inventor's own original 'Hickeys and Gadgets', which will show the pilot his correct location and point the direction of his destination. He says they will give him a sixth sense like that of a carrier pigeon and prevent his getting lost.

"For some reason that Mr. Hansen cannot understand, everyone of the Municipal Airport is still somewhat skeptical and refuses to take his invention seriously. Olaf says his friends in Minnesota will raise $100,000.00 to bet that he can fly around the world in twenty-four hours. Local pilots seem to be afraid of him, as this bet remains untaken."

"Well that's good!" Dewey exclaimed. "A sucker with five thousand bucks gets away and leads us to another with a hundred thousand. I'll take his bet! I can use that hundred grand!"

'Wait a minute! Wait a minute!" protested Joe. "Don't think you can take a sucker off of my hook. I saw that paper first."

"Don't crab! I'm lettin' you in on it too, ain't I?"

"You fellows can't walk away with all that easy dough," Mike interrupted. "You gotta count me in on it too. I ain't goin' to stay up here and work like a slave while you birds go to Akron and get all the gravy."

An Interview With Capitalists

THE next day the public was unable to place any bets on the races. The bookies had disappeared and it was rumored in the poolrooms that some disappointed sucker had tipped off the cops. But in Akron, Mr. Olaf Hansen was showing his plans and photographs to three "Capitalists," who were interested in buying his invention. Olaf was very much pleased to know that there was someone with brains and money who took him

SINCE Jules Verne wrote his story "Around the World in 80 Days," his fantastic effort has been vastly eclipsed and the world has been circled many times in a greatly reduced time, the latest official record being 351 hours or 15 days of flying time.

Sooner or later, we will be able to travel at the same speed as the rotation of the earth, which being a thousand miles an hour, will permit us to circle the planet in 24 hours.

Mr. Romans in his present story, shows us a way to do so and it is not any more fantastic than Jules Verne's story was a few decades ago. While perhaps fantastic to-day, a human being will circle this earth in 24 hours, and people now living will see or read about this exploit, and perhaps take part in it.

seriously, so he gladly showed all his plans, but unfortunately, his invention was not for sale.

After examining the photographs and plans, the "Capitalists" did not think the plane would ever leave the ground.

"I'll yust bet you any money that she can fly around the world."

"We are not gamblers; we are financiers," Mr. Dewey Burns replied. "But if you have enough cash to make it interesting, we will bet you even money that it never gets twenty feet off the ground."

"Well, I bane got three thousand dollars of my own, but some of my friends up in Minnesota bane got yust one hundred thousand dollars that says I will fly around the world in twenty-four hours, if you fallers bane willing to give them odds of ten to one."

"Ten to one? Man, you are crazy! That will take a million to cover our end of the bet and we don't want to put up that much money."

"Well it bane ten to one or nothing. I said around the world in twenty-four hours and what's a million to three rich fallers like you?"

"Oh it's not much, but we want to see your plane before we decide."

"Well the plane bane in my shop out in the back yard."

The Minute Man had its wings folded along its sides and looked like a giant grashopper with two long antennae extending from its head, just out of the way of the propeller. At the end of each antenna was a glass sphere about six inches in diameter, the inside of which was coated with something the "financiers" thought was silver. A similar rod and ball extended a few feet past the rudder and from each sphere a small light bulb was suspended. Olaf explained that these were his headlights and tail light and the "Capitalists" accepted the explanation that the glass spheres were for ornamental purposes. They exchanged winks that Olaf did not see and expressed the opinion that they did add to the beauty of the plane.

When they attempted to push the plane out into the open, it was so heavy that the four men could not move it, but Dewey overcame the difficulty by attaching a tow rope to it and using his big sedan to pull it out. The wings were now spread to the extent of thirty feet and it was noted that they had a slight resemblance to the wings of a bird. The short propeller was home made and it showed it. One blade was two inches longer and a trifle narrower than the other, but as it balanced, Olaf "bane thought it was yust as good as any." The motor showed its age both in appearance and sound. The other gadgets were dirty and looked useless to the financiers. After giving the plane a critical inspection, the "capitalists" retired into executive session:

"Barnum was right," Dewey remarked. "There is one born every minute."

"Now I know what a Minute Man is!" Joe Murphy exclaimed.

"What is it?"

"It is one of those fellows that Barnum said was born every minute."

"Do we want to take his bet?"

"Do we want to turn down a hundred thousand?"

"But them Swedes want odds of ten to one."

"That's fair enough. What's ten to one on a sure thing?"

"But where are we going to get a million dollars?"

"We three will form a little syndicate and let our friends in on it at twenty to one and split the profits. Are you on?"

"How do we know that this Swede can raise a hundred thousand?"

"We will see that the hundred thousand is deposited in a bank along with our million before the thing starts."

"How long will it take our syndicate to raise the million?"

"About a week."

"Then we will give this Swede a week to raise his money, but it is best that we don't let him know but what we plank down a million tomorrow."

Ready to Take Off

TEN days later the Minute Man was towed to Fulton Field behind a tractor, amid the jeers of all who saw it. The newspapers had seen a chance to give their readers a laugh, so Olaf and his Minute Man received a lot of publicity. It was not the kind of publicity that most men care for, but he was far from being discouraged. His little bet would make a million if he were successful and he was as sure of success as Robert Fulton was the day he demonstrated the Clermont on the Hudson.

Dewey and his friends were just as confident as Olaf. They had found but little difficulty in raising the million, which with Olaf's hundred thousand was deposited in a bank. The winner was sure the bet would be paid. They had never seen a sucker half as dumb as Olaf. The idea of that heavy plane flying was ridiculous, particularly so since it was propelled by a second hand Ford motor of the vintage of 1930.

Olaf had had considerable difficulty in obtaining permission to use Fulton Field for his take-off. "We have never had a smash-up out here," he was told. "We do not believe your plane to be sky-worthy and it would be a disgrace to the airport if we let you go out there and have a smashup. We only want to maintain the perfect record of Fulton Field."

"But I will not have a smashup," Olaf told them.

"We hope not, but we are not taking any chances. But in the interest of aviation, we will give you the benefit of all doubt and send a man to examine your plane. Remember that his decision will be our decision."

A reputable pilot had examined Olaf's plane and his decision was: "There is no danger. That plane cannot move across the field under its own power. It is heavy and the motor is weak. The papers have been poking fun at him and the public is taking it as a joke. There will be a big crowd out here to see the fun and believe me, this is going to be a circus. Did you see today's paper? They are giving us the razz. They say that due to the jealousy of our pilots, we refuse to give the man a chance. If we turn him down, he will go to some other field and we will lose the publicity. I say let him go to it, but make it distinctly understood that we are not connected with the Minute Man in any way and assume no responsibility for anything that happens or fails to happen."

The humorous publicity given by the newspapers had attracted a large crowd to Fulton Field. Papers in other cities had not said much about him, so if Olaf did succeed in getting far from Akron, he would have to appear unannounced. No one expected him to leave the ground and there were a few who did not expect him to leave the field alive. To give the pseudo-financiers all the credit due them, it is necessary to say that

Dewey Burns had arranged for an ambulance to be on the field at his own expense.

Olaf had hoped to take off before noon, but there were so many other planes coming in and taking off and so many people wanted to examine the Minute Man that it was 2:30 before everything was in readiness. Dressed in his "Aviator Suit," Olaf looked more like a moving picture comedian of the old type than anything else. His uniform was too big for him and his big bushy mustache made him look just as ridiculous as the Minute Man. Amid the jeers of a thousand spectators, he climbed into his cabin and closed the door.

At last the motor was started and it sounded as though only two cylinders were working. The propeller was turning, but it had no speed and the plane refused to move. This was exactly as everyone expected. As the crowd became more noisy, the unexpected happened—the Minute Man started to move slowly across the field in a zigzag course. A Scotchman offered even money that he would never leave the ground. Dewey Burns raised the odds to twenty to one, but neither offer was taken.

The Minute Man was acting very strangely. It was unable to move in a straight line and continued to slowly wobble across the field. At the far side of the field, it turned in a circle and headed toward its starting point. Until it had reached the middle of the field, its speed had not been more than ten miles per hour. The crowd was very noisy and the gamblers were very happy.

An Exposé

SUDDENLY one thousand jaws dropped; one thousand mouths opened to their widest capacity; one thousand voices were silenced and two thousand eyes stared in amazement! The Minute Man had suddenly increased his speed and shot toward the spectators with a speed none of them had seen before. Women screamed and men started to run, but on came the Flying Swede. Just as he was about to crash into the spectators, his plane turned its nose toward the sky and rose at an angle steeper than forty-five degrees, which soon straightened out until he was traveling straight toward the zenith and his speed continued to increase. Olaf continued to rise until he was almost out of sight and then something apparently went wrong—his plane started to fall, turning end over end and the spectators began looking for a place of safety.

When about three hundred feet high, his downward flight was checked, but the plane continued to turn end over end and move out over the field, where the crazy turning stopped and the plane slowly dropped to the ground. Olaf stepped from the plane and began working with his propeller, which he took off and threw away. "Ay bane tank that thing was yust a little too lopsided" was his only comment.

He then climbed into the cabin and started off again, but he had not gone more than one hundred feet until his motor dropped out, which did not interfere with his progress in the least. Just as he left the ground, his landing wheels dropped off and the spectators saw that the device that held them looked like the claws of a bird, apparently capable of grasping and holding anything. The Minute Man now rose vertically to an altitude of two thousand feet, looped the loop and did all the stunts commonly known to aviators before entertaining the crowd with his own original stunts, which ended by dropping his plane toward the crowd, checking his fall at an altitude of one hundred feet and remaining suspended in mid-air. He now dropped to a lower altitude and remained motionless while he opened the door of his cabin and addressed the crowd:

"You are now witnessing the first public demonstration of a new type of motorless airplane that is due to revolutionize the entire industry. It was not my intention to frighten you as a punishment for laughing at me, but I wanted to convince you of the safety of the Minute Man and the ease with which it can be controlled. As you have no doubt guessed, I am using a new principle of propulsion and suspension in the air, but until I return to this field about this time tomorrow, I am making no explanations.

"It is my intention to fly around the world in the same time the earth turns on its axis. I believe the Minute Man is capable of doing this and if the cities of Chicago, Kansas City, Denver and San Francisco are notified that I expect to visit them this afternoon, I am positive that the newspapers and radios will keep you informed of the progress I am making.

"I regret that it was necessary for me to resort to such absurd tactics during the past two weeks in order to accomplish my purpose. But there was method in my madness and I assure you that I am not only sane, but fully aware of the dangers and vastness of my undertaking. It is now ten minutes until three o'clock and we shall call that my official starting time. Within ten or fifteen minutes, I will be in Chicago. Within two hours, I hope to be in San Francisco. Good-bye, I'll see you tomorrow at this field."

The strange plane and its strange pilot now rose vertically and one minute later had reached an altitude where he was no longer visible.

It was five minutes after three in Chicago* when a strange type of monoplane was seen flying over that city. About the same time the newsboys on the street were shouting that there was an "Extra! Just out!!" Those who glanced at the extras immediately identified the strange flyer as the mysterious Minute Man who had left Akron only fifteen minutes earlier. The people in the streets were too surprised to believe it. Was it possible that this silent, motorless monoplane had flown from Akron, a distance of 300 miles, at a speed of twenty miles per minute? Many remained skeptical, but the majority, as they saw the Minute Man doing stunts no other plane had ever attempted such as rising vertically, remaining motionless in midair or spinning like a top, accepted the story as the truth and cheered the unknown flyer.

But the biggest thrill of all came when he flew to a flagpole on the top of a skyscraper and folded the wings of his plane and perched on the flagpole like some great bird! An instant later a small package was thrown to the people in the streets far below. This package contained a brief message: "The Minute Man, flying around the world, greets the people of Chicago. I will stop next in Kansas City, in about fifteen minutes."

After resting for less than a minute, the plane again spread its wings, rose vertically until it was no longer visible and was on its way.

Across the World

BY the time the Minute Man arrived in Kansas City, news of his strange flight had been spread to all the cities in the country. At first no one was willing to believe that the impossible was being accomplished. But as news from different reliable sources began to arrive,

* When no other time is mentioned Akron time, Eastern standard, is understood.

all doubt was banished. In Kansas City the streets were filled with people looking for the mysterious plane several minutes before it arrived. When it did appear, dropping swiftly and silently from the skies, every whistle in town began to blow. The streets were packed and the roofs of office buildings and factories were covered with the cheering multitudes.

The mysterious aviator spent less than five minutes in Kansas City doing the same impossible stunts that had thrilled Chicago only twenty minutes earlier, before perching on a flagpole and dropping a message to the cheering multitude in the streets.

In Denver his reception was more enthusiastic than ever. During the five minutes Olaf spent in that city, there was more excitement in town than there had been since that historic day, November 11, 1918. In San Francisco the populace acted like madmen. The Minute Man had gained an hour on the sun! It was now 1:45 P. M., San Francisco time and 4:45 Akron time. He had been on his way almost two hours, but due to the difference of three hours in time between the two cities, the sun was one hour higher in the sky when he arrived in San Francisco than when he had left Akron. But it soon began to look like the hour that he had gained would be lost if he continued to delay in the city of the Golden Gate. He seemed to dread starting the most perilous leg of his journey, across the vast Pacific. But at last he dropped a message announcing that he expected to make his next appearance in Honolulu, after which he rose in the air and was soon lost to view in the blinding rays of the midsummer sun.

Excitement now prevailed in every city in the United States. Huge crowds gathered at newspaper offices, eager for news from the mysterious flyer. Radios were tuned to those stations that had promised to broadcast news of his progress. Never before had the world so suddenly turned its attention to any one man. Never before had anyone ridden so quickly to fame from total obscurity and ridicule. No one had any idea as to the true identity of the intrepid flyer, but it was universally believed that he was not the illiterate sort of person he had pretended to be for the past two weeks. But why should he resort to such a ridiculous masquerade? One thousand and one theories were advanced concerning his method of propulsion and suspension. Gravity control, atomic energy, radium, rocket recoil and even supernatural power had been suggested and discussed. The newspapers were filling the pages of their extras with countless theories, while great men and the near-great spoke for hours over the radio, explaining that which could not be explained—but still, the public knew no more than they did before.

In a room in a certain hotel in Akron, three sorry gamblers were listening to a radio and discussing the events of the day.

"Cheer up Dewey, we still gotta chance."

"Yes! A whale of a chance we got! I'm tellin' ya that Swede played us for a bunch of suckers and we swallowed hook, line and sinker. I told you there was something crooked about that guy. We are going to lose our million and how will it look tomorrow when the headlines come out saying: 'Dewey Burns tries to beat a man at his own game'?"

"Well, there's no use crabbin' over spilled milk," Joe remarked. "Let's see if we can't figure this thing out. It took him two hours to fly from here to Frisco. He has been out of Frisco for over two hours now and it's time for him to be showing up some place. They say there is one hell of a storm over the Pacific, in the neighborhood of the Hawaiian Islands. The way that bird hesitated about starting out from Frisco shows he ain't any too sure of himself when flying over water. Another thing, he did not know anything about that storm and like as not he is on the bottom of the ocean right now."

"Like as not he is so high above that storm that he don't even know that it's raining. We know that he does his speeding at high altitudes."

"I wonder why?" Mike Brodie asked.

"Less friction from the atmosphere. He is traveling at a speed of something like twenty or thirty miles per minute and that is cutting the wind pretty fast. You know what a shooting star is don't you? ? It is a meteor that goes through the air so fast it catches fire and burns up. This fellow is goin' as fast as a meteor and maybe he will catch fire and burn up too." Dewey answered.

"But he did not burn up between here and Frisco. How fast do these meteors travel anyhow?"

"How should I know?" Dewey asked.

"I wonder if there is anyone in this town who does know. Have they got a college here in Akron?"

"Akron University."

"Joe, you go and call them up and see how fast meteors travel."

Joe returned a few minutes later with the desired information:

"They say the average velocity of a meteor is 35 miles per second and the Minute Man is only goin' at 25 or 30 miles per minute. He will have to go more than sixty times as fast as that before he catches fire."

"While you were gone the radio said that the Minute Man had arrived in Honolulu amid a severe storm. His plane was in perfect control and he did his stunts for the benefit of a mob that stood out in the rain cheering their fool heads off. Our million is shot and we are sunk!"

"We now have another bulletin from Honolulu," a voice from the loud speaker was saying. "It says: 'After spending eight minutes in Honolulu, the Minute Man rises in the air and disappears. Believed headed for Japan. Severe storm continues over Pacific.'"

It was after eleven o'clock before Dewey and his friends learned anything more from their friend Olaf Hansen. The newsboys on the street became more noisy than usual. There was another "Wuxtra! Just out! Read all about it!! Minute Man now in Japan!!!"

While Joe Murphy was out buying a paper, Dewey and Mike heard the voice from the loud speaker read another bulletin:

"The Minute Man crossed the Pacific in less than five hours. We have just learned that he arrived in Tokio shortly after noon, Tokio time. That would be about ten-thirty Akron time. He has flown from Akron to Tokio in seven and one-half hours. If he maintains that speed, we may expect him at Fulton Field before noon."

Back in Akron

THROUGHOUT the night, messages were received from the Far East, telling of a strange, silent monoplane that had made its appearance in Korea, Shanghai, Canton, Hongkong and even Manila. The speed of this mysterious flyer was incredible. He would no sooner leave one city until he would appear in another. It was a great night for the newsboys. No sooner would one extra be on the streets than the newspaper office would have enough material for another, all of

which found a ready sale in the streets, hotel lobbies, clubrooms and restaurants that were usually deserted for a few hours during the night. By dawn, extras were selling at prices ranging from ten to twenty-five cents, telling of the Minute Man's visit to Singapore, Ceylon, Bombay, Egypt and the Holy Land. The world was now thoroughly aroused and wondering who was flying around it.

At 7:00 A. M. three sleepy gamblers were reading an extra telling of the arrival of the Minute Man in Constantinople at 1:00 P. M. (6:00 A. M. Akron time.) Business failed to start that day in all American cities. It was an occasion for an unofficial holiday and everyone was making use of it. And why not? Was the most momentous thing in the history of human progress not taking place? Would this day not go down in history as one of the most important days since October 12, 1492?

From Constantinople the unknown flyer flew to Vienna, thence to Venice and Rome before going to Paris, where he received a welcome that even Col. Lindbergh would have declared the greatest ever given any aviator. Paris was thrilled by the unusual stunts of this Flying Swede, who had flown from America to Paris in less time than any other flyer, even after choosing the longest way around. When he made a perfect landing on the top of Eiffel Tower, folded his wings like a giant bird and rested, the gayest city in the world cheered louder than ever before. Nor was their ardor lessened when he announced that before going to London, he expected to pay a short visit to Berlin.

Berlin was even more enthusiastic than Paris. The noise of their celebration was the biggest racket in the long history of that city. Berlin had long been a city of air-minded people and a plane with the speed and remarkable qualities of the Minute Man aroused their admiration to the Nth degree.

London was now honored by a visit from Olaf Hansen and his famous Minute Man. The largest city in the world welcomed the mysterious flyer with an enthusiasm that had never been shown any other single individual. At 4:00 P. M., London time, (11:00 A. M. New York and Akron time) the mysterious flyer dropper a message bidding good-bye to Europe and announcing that he would soon be in New York.

"What a butterfly that caterpillar turned out to be!" exclaimed Mike Brodie as he finished reading of the Minute Man's reception in London.

"You mean what caterpillars us butterflies turned out to be," Dewey corrected. "That worm ain't fooling me. He ain't flying around the world a bit more than I am."

"How do you know he ain't?" Mike asked.

"Because it's impossible, that's why! That Swede is a fake and he is trying to gyp us out of a million bucks."

"You don't mean to say that the papers and radios are lyin' to us do you?"

"Not exactly; this Swede is foolin' them too. He has a confederate in each of them cities he is supposed to be visiting and just at the proper time this confederate comes out and flies around and makes people think it is the same plane all the time."

"But how are we goin' to prove it?"

"We can't but one of us shoulda went along with him."

The reception of the Minute Man in New York is now a matter of history. New records were established in giant celebrations that will never be equalled until someone does something more spectacular than flying around the world in twenty-four hours. But the Magellan of the Air could not be bothered with celebrations. He was due in Akron before three o'clock and there were other cities to be visited before his voyage was complete. Atlantic City, Philadelphia, Baltimore, Washington and Pittsburgh each had a chance to see the now famous Minute Man before he arrived in Fulton Field.

Fulton Field was the center of the world's attention that afternoon. Noted flyers, aviation experts, thrill-seekers and thousands filled with curiosity and enthuiasm filled every square foot of available space within two miles of the Airport. eager for a glimpse of the intrepid flyer and his mysterious Minute Man. At 2:37 P. M., just 23 hours and 47 minutes after he had started around the world, the most famous plane in the world was seen circling the field, high in the sky. It came downward just like any other plane about to make a landing, but at an altitude of one hundred feet, came to a full stop in midair, and folded its wings. The mysterious pilot now demonstrated that he could fly with his wings folded just as easily as any other way. After doing a few stunts at this low altitude, he again brought his plane to rest in midair at a point where he could address the multitude assembled on the field.

At the same moment, two miles away, police officers were having trouble with three noisy gentlemen in a big sedan, who insisted upon an immediate right of way to the Airport.

"I can't help it if you are friends of his," an officer was saying, "you are going to stay back here where you belong. This crowd has been waiting out here all day and you just got here. What do you think this is? I ain't goin' to make them all get out of the way just for you!"

"Wouldn't that burn you up?" Dewey Burns asked his friends. "Here we are paying a million bucks for this show and that cheap cop won't let us in!"

"What are you barkin' about? It's all your fault that we're payin' for it! You coaxed us into this deal!"

"Coaxed? Where do ya get that stuff? You squawked because you thought I was goin' to grab it all for myself, if I remember anything about it."

"Aw—Shut up!"

An Explanation

"MY friends," the Magellan of the Air was saying, "the impossible has just been done again. Only a few short years ago it was mathematically proven that a heavier-than-air machine could never fly. A short time later I had the pleasure of helping in a small way to disprove that authoritative statement. No doubt there are some among you, who remember me in the earlier days of aviation. Although I was never nationally known, those who have never heard of me will have no difficulty in finding my name among the pioneers of aviation. Neither will there be much trouble in learning of the things I did before and during the war, to make aviation safer. My name is not Olaf Hansen and I am not from Minnesota. My name is Harry Williams, but mostly called 'Windy' Williams for short."

This name was far from being unknown to the older aviators. "Windy" Williams was not only known as a daredevil clown of the air, but he had assisted in designing several of the devices now in common use on all planes and he had been one of the first to find a

commercial use for planes. He was just the type of person to resort to absurd methods for spectacular purposes, but for eight years he had been unheard of at all flying fields. Certain pilots could now recall a statement he had made shortly before he disappeared, to the effect that when he did appear on a flying field again, he would have the undivided attention of the entire world.

"I have been having a lot of fun during the past two weeks, by resorting to absurd tactics in order to accomplish something and satisfy a personal ambition," Williams continued. "I knew that such an opportunity would never come again, so it was now or never with me. During my entire life I have gambled heavily on race horses and have always lost. I wanted to square accounts with certain gamblers and win back the money I had lost. With that purpose in mind, I made the Minute Man look as ridiculous as possible and through the assistance of a few friends, the gamblers were induced to bet a large sum that my flight around the world would be a complete failure. In addition to obtaining revenge, I saw an opportunity to increase my capital for the purpose of manufacturing ships like mine. That explains my ridiculous masquerade, which I am now casting off.

"You are now witnessing the conclusion of my first public demonstration, but this is not the first time I have tested the Minute Man nor the first time I have flown around the world in less time than the earth turns on its axis. On former occasions, I did not carry any engine, prop, wings or other things that other ships find necessary. Yesterday I found I was encumbered with excess baggage, so I discarded many of my non-essentials before I started. My power does not come from a motor, but from over a hundred 45-volt dry cell batteries, which will last for over a week of continuous flying. I do not use atomic energy, gravity control or rockets, but a force of my own discovery—Atmospheric Pressure Control, which will require some explanation.

"Years ago, while trying to eliminate some of the hazards of aviation resulting from that menace of the air commonly called 'Air Pockets,' I made the discovery that this mysterious vacuum existing in midair was caused by electrical disturbances very similar to lightning and the static that causes so much trouble in radio reception. After several experiments, I learned that I could make artificial air pockets and maintain them under any conditions but I also discovered that for every area of vacuum or decreased pressure, an equal area of high pressure was formed. Later experiments taught me how to destroy my air pocket and high pressure area by letting the excess air in the high pressure zone rush toward the low pressure zone.

"An idea now suggested itself for utilizing my discovery for commercial purposes, but as I am of a selfish disposition, I decided to keep my work and my discoveries a secret until they were proven successful. It was several years before a device was produced that would constantly create the high and low pressure zones and let the excess air from the high pressure area flow constantly toward the low. There was another long delay before I learned how to control the intensity of the high and low areas and the force of the air passing from one to the other.

"Away from prying eyes, on a farm whose location I am not yet ready to reveal, I constructed a small automobile propelled by the rushing air from the high to low pressure zone. I found that I could produce a speed that was unsafe for ground travel, which caused me to build my first Minute Man, a car without wings that would fly through the air, being suspended in the air by a low pressure zone overhead and a high pressure zone beneath it.

"This is my third Minute Man, the result of eight years of experiments. Those two bright spheres on what have humorously been called antennae produce a vacuum, the intensity of which is regulated by the current passing through it from my batteries. The larger sphere at the rudder produces the high pressure zone. With a vacuum in front of me and double pressure behind, my speed is fabulous and regardless of the speed, the pilot has no sensation of passing through a strong wind, because the air surrounding the car is moving at the same speed as the ship itself. I have attained a speed of forty miles per minute—2400 miles per hour—but that speed is not only unpleasant but unnecessary and dangerous, due to the effects on the pilot from rapidly accelerating or decelerating the speed.

"The weight of the car is regulated by the same method. The small spheres under the car produce a high pressure area while others above produce a low. When the proper electrical current passes through the spheres, the upward pressure against the car is exactly balanced by the force of gravity acting on the car, which becomes apparently weightless. But the wind would blow the weightless car away if other precautions were not taken. The rudder now acts as a weather vane and the nose of the ship is pointed windward. The ship is pointed toward the wind with a velocity exactly equal to that of the wind itself. I still have one hand on the control knob and as the velocity of the wind is seldom constant, I find it necessary to increase or decrease the power. That explains how it was so easy for me to remain motionless in midair or to perch on a flagpole in imitation of a giant bird, even in the windy city of Chicago.

"I have no intentions of explaining how the spheres control the atmospheric pressure at this time, but as soon as my attorneys secure the necessary patents at home and abroad, a detailed explanation shall be forthcoming. But for the present, I must ask you to take my word for it that the Minute Man is quite successful and such an improvement over the gasoline motored airplane that it will revolutionize the industry just as soon as my factory begins quantity production and turns out ships that will be Minute Men in every sense of the word—produced at the rate of one per minute and like the Minute Men of 1776, ready for any emergency upon a minute's notice.

"They will be built in all practical sizes and sold at prices ranging from five hundred dollars to five thousand. They will not only replace the present type of airplane, but within a decade they will replace the automobile. They will be built in such sizes as can be kept in the family garage, capable of taking off from any back yard and making a landing on a flagpole.

"But I want it known that this invention is not for sale. If anyone is to make a fortune out of my invention, it will be 'Windy' Williams himself. I do not expect to make any high profits from the manufacture and sale of Minute Men. I expect to pay the best of wages for the best of service and give the best possible ship at the lowest possible selling cost. Plans are already made. My factory is now under construction and a limited number of shares of preferred stock will soon be offered for sale. But I shall see that this stock never pays any fabulous dividends. The real dividends

will be reserved for my customers and my employees.

"We are standing on the threshold of a new day in aviation. I have proven the merits of the Minute Man by submitting it to the most severe test and the whole world has just witnessed my triumph. I have shown the world the type of ship that will soon be flying around it in all directions, in twenty-four hours. I have given wings to mankind. I have eliminated distance and brought the East to the West and the West to the East and on the common ground of rapid transportation and mutual progress, the twain shall meet."

Those who jeered twenty-four hours earlier now cheered the Magellan of the Air, as the Minute Man, with its wings still folded, rose silently and swiftly toward the zenith and was lost to view in dazzling radiance of the bright midsummer sky.

In the seclusion of their room at the hotel, the three most unhappy men in the world were reading the speech given by the Magellan of the Air.

"So it was 'Windy' Williams, one of our oldest and best customers, who pulled that fast one!" Mike Brodie commented. "What will people say?"

"They'll say plenty, but who ever thought 'Windy' was an aviator?"

"Or a scientist?" Dewey added.

"Or the kind of a guy who would gyp us out of our money?"

"Well it sure is tough luck." Joe Murphy remarked.

"Yes it is goin' to be tough for a while," Dewey answered, "but we'll come out Okay."

"What do you mean Okay?"

"Don't you know 'Windy' Williams as well as I do. Ain't he always been one of our most dependable customers? 'Windy' may be an aviator and a scientist and know more about Atmospheric Pressure Control and those things that I do, but I'm a great little scientist myself."

"You are! What do you know about science?" Mike asked.

"I'm a great little student of human nature and I've always noticed that when they are once a sucker they are always a sucker. Windy will be a busy man for a little while, but just as soon as he gets some spare time on his hands, we will not only get our money back, but we will be runnin' the Minute Man factory."

And Murphy nodded in silent assent.

THE END.

Editor, AIR WONDER STORIES,
98 Park Place, New York City.

I have checked on the coupon below, the stories I like best in this issue and have listed them in the order of my preference:

1 . . . . .

2 . . . . .

3 . . . . .

4 . . . . .

5 . . . . .

Remarks and suggestions:

. . . . .

. . . . .

. . . . .

. . . . .

. . . . .

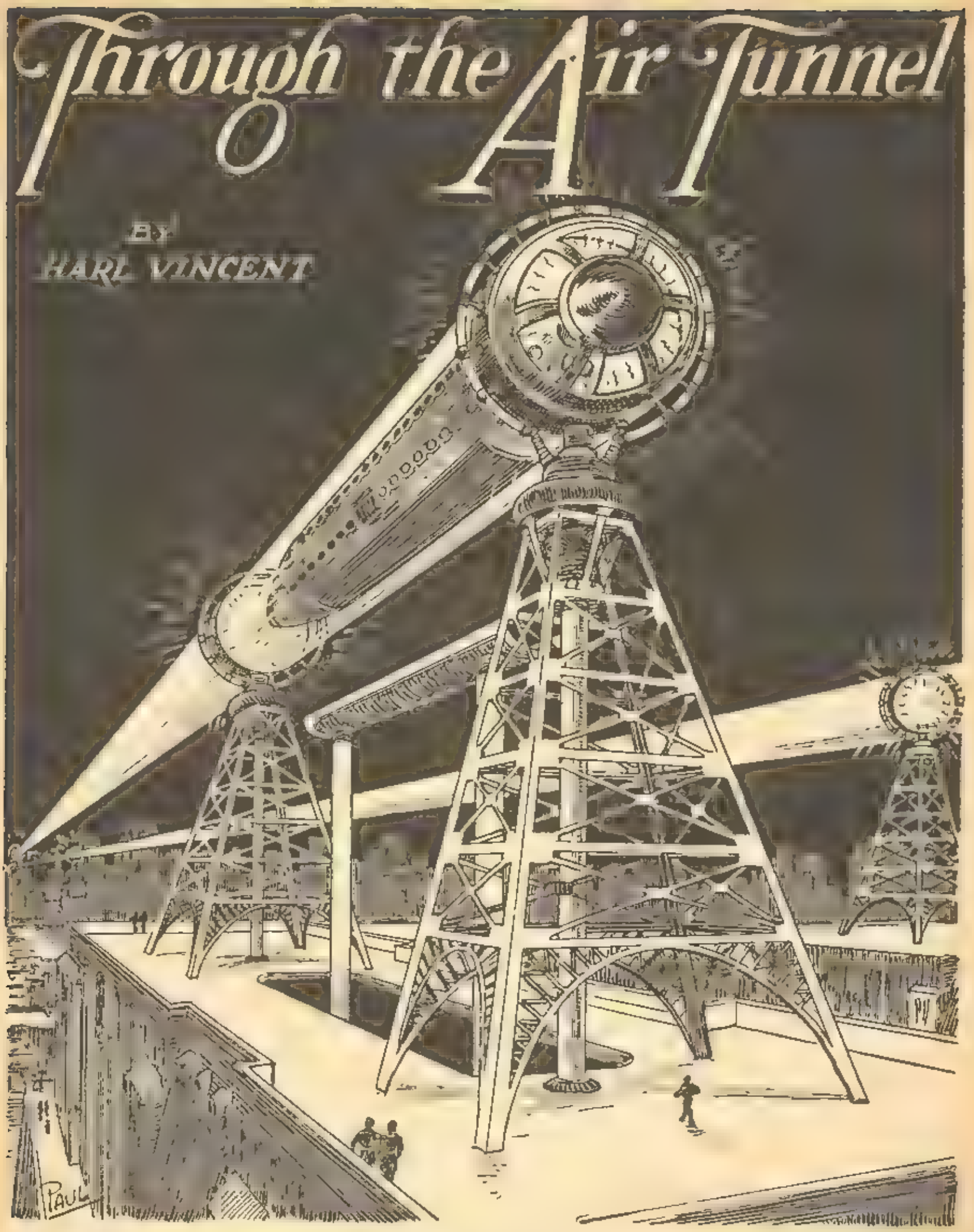
Name . . . . .

Address . . . . .

City . . . . . State . . . . .

Through the Air Tunnel

By
HARL VINCENT



Arm in arm they left the station. Two hundred feet above their heads streamed westward the two orange beams that were the east and westbound tunnels, forming two great pencils of light.

THE pretty chin of Doris Townsend was set at a rebellious angle, yet for all her determined manner and speech she was perilously close to tears.

"But Daddy," she repeated for at least the tenth time, "I love Jimmy Streeter. And I loathe and detest Ashley Hoyt. I won't marry him—I won't—I won't!"

The broad face of her father purpled as if he were about to burst with exasperation. "Doris," he stormed, "we've been over this matter in detail no less than a dozen times and I tell you that I mean what I say. You are too young to know whether you love or hate any man. You'll learn to love Ashley after you have married him. Besides, he has immense wealth and his financial backing is of extreme importance to me. This Streeter is a good-for-nothing inventor and a man who could never make you happy. He never will amount to anything. You'll marry Hoyt and forget his no-account rival or, by George, you'll go to your Aunt Hetty in Bombay for five years—five years, mind you. This is final."

EARL VINCENT

Jerome Townsend was furious, and the threat was one to give pause to the protesting girl. For Aunt Hetty was the inflexible maiden aunt who had theories of her own on the proper treatment and bringing up of marriageable daughters and whose gloomy house in the distant city had seemed like a cheerless prison to Doris since her earliest recollections. So she stifled her indignation and changed her tactics.

"All right, Daddy," she said, "I'll do as you say. But give me a month before promising Ashley definitely."

"Now you're talking sensibly. And you may have the month—only give me your word you'll not run off with young Streeter in the meantime."

"I promise."

Jerome Townsend smiled, and the appearance of imminent apoplexy vanished from his features. He disliked these scenes with Doris, whom he loved dearly, but he had set his heart on the match with Hoyt and honestly felt that it was for the girl's good.

"That's a good girl," he beamed, "Now kiss me and run along. I am going to be very busy this afternoon."

Doris pinched his cheek as she bestowed the filial kiss, and then tripped from the room as if she were entirely satisfied with the arrangement. But when she reached her own boudoir she threw herself on the bed and sobbed her disappointment into the uncomfortable and uncomforting pillow.

It was in the summer of 1958, when youth was supposedly at the height of independence, but there still remained a few relics of the old-fashioned parents who believed they were entitled to the obedience of their offspring. This was especially true of wealthy, widowed fathers who dwelt in lofty Park Avenue apartments with only daughters and retinues of servants.

Doris, it must be confessed, was a bit old-fashioned herself. She despised the Younger Set; abhorred parties, petting, and all the known varieties of making whoopee. She loved Jim Streeter, but she loved her foolish old dad too. So she was in a quandary.

A Director's Meeting

IN downtown New York, much farther down than where Doris was weeping in discouragement, there sat a meeting of the Board of Directors of Air Tunnels, Incorporated. Ten men surrounded a huge mahogany table in an airy room on the one hundred and sixtieth floor of a building whose choicest suites overlooked Battery Park and the harbor. One of the men, a youngish chap and handsome in a darkly arrogant fashion, was thumping the table vigorously as he argued. This was Ashley Hoyt, an influential member of the board.

"I tell you gentlemen," he averred, "this Streeter is an impecunious fellow who has not a single successful invention to his credit. He is a dreamer and a sentimentalist who is over-confident in his own ability and is merely attempting to get an appropriation from us to permit of his carrying on some further wasteful experimentation. I am against it."

The speaker's face was hotly flushed and his lips curled in scorn as he mentioned the name of James Streeter. But Duncan Q. Moore, chairman of the board, knew something of the reason for this enmity. He smiled tolerantly over the outburst.

"Ashley," he said, "we should not allow personal prejudices to stand in the way of the progress of our organization. Streeter is asking for very little and, after investigating his claims through the agency of a prominent firm of engineers, I am convinced that there is something in them."

"Have you the engineers' report?" asked Hoyt angrily.

"I have, and it incorporates an unqualified

OUR talented author has given us a real treat in the present story, which is as daring as it is unusual. We may safely say that nothing similar to it has appeared in print before.

Aviation engineers appreciate the fact that there is a limit as to how fast aircraft can move through the air. If the speed gets too great, let us say, above 350 miles an hour, the air resistance becomes so terrific that the amount of power required to move the ship through the air makes the cost prohibitive. For that reason, engineers even now are busying themselves to devise machines that can go up so high into the upper atmosphere, where the resistance of the air is considerably diminished.

In recent years, engineers also have been devising means, such as subways, whereby trains could be sent through a tube evacuated of all air—the train would then move in a vacuum The cost of building such a tunnel, however, and the delay in getting the passengers in and out, made the scheme impractical.

The author of this story with his characteristic boldness, has suggested an entirely new plan, which is based upon good science, and there is no telling but some day the problem may be solved in some such manner.

recommendation that we go ahead with his plan."

"What? They recommend that we invest nearly a quarter of a million dollars in a hare-brained scheme of this crazy inventor to increase the speed of our tunnel traffic five times? It is unthinkable."

"That is precisely what they advocate, however. And let me remind you that we are a three hundred million dollar corporation and that we paid better than twelve per cent in dividends last year, with every prospect of increasing the surplus greatly this year. It will cost but two hundred thousand to try out this scheme of Streeter's and, if the thing is a success, our earnings will be doubled or trebled. If it should prove to be a failure we have still hardly cut into our undivided surplus for the first quarter of the fiscal year."

"I am against it!" Ashley Hoyt was obdurate.

"You are unreasonable," responded the chairman impatiently, "and I am astonished at the warping of your business judgement by this hostility toward Streeter. Our transcontinental tunnel is now overloaded and it is impossible to increase its capacity under existing conditions. The trip from New York to San Francisco can not be made in less than six hours and freight is piling up at the terminals so that the handling of it is becoming a serious problem. If Streeter's invention is fully successful we are assured of reducing the time for the trip to about an hour and a quarter. Think of the increased revenue to be obtained thereby!"

"Suppose we put it to a vote," spoke up another of the directors who had been listening intently, "I am in favor of giving the thing a trial, regardless of the feelings of Mr. Hoyt."

The objector scowled darkly but a chorus of assent drowned out the quick reply that sprang to his lips.

"I guess that makes it unanimous, yourself excluded," spoke the triumphant chairman, nodding in Hoyt's direction.

"Oh very well," grunted Hoyt ungraciously, "I suppose I'll have to give in. But do not forget that I warned you regarding this experiment."

He arose stiffly and bowed himself from the room, oblivious of the amused grins of his associates.

And so it was that the young inventor, who awaited anxiously in the outer office, received official notification of the approval of his plans and instructions to proceed with them at once.

A Lovers' Meeting

MEANWHILE Doris had composed herself and was carefully removing from her pretty cheeks all evidence of her recent spell of weeping. And when her maid entered the room with the information that Jimmy Streeter was calling she flushed to the roots of her hair.

"But father!" she gasped.

"He's left for the office, Miss Doris," was the comforting reply.

And it was but a few seconds later when she was swept into the arms of young Streeter who awaited her coming in the drawing room.

"Jimmy," she exulted when he had released her, "You've done it. I can see by your expression that your plans are to go through. Am I right?"

"You are, sweetheart. I am to go ahead immediately with the changes to the westbound transcontinental tunnel. And success is in sight at last."

"Oh that is splendid. I just knew you would do it, though I still do not understand what it is all about."

"Why honey, it is the simplest thing in the world. You know how the regular air tunnels operate?"

"Not fully. It has always been quite a mystery to me, but I do know that radio has something to do with it."

"Yes it is radio, of a sort. You see the so-called air tunnels are hollow cylinders of etheric vibrations projected from point to point in the same manner as the regular beams over which industrial power is transmitted. In the case of the great transcontinental tunnel there are twin tubes of these vibrations stretching in a huge arc from coast to coast, one for eastbound and the other for westbound traffic. The cars travel within these cylinders. The vibrations themselves are very complex in nature. One component provides insulation against the elements as effectively as though the cars traversed a solid metal tube. Another provides the dark color by day and the brilliance by night that warns standard aircraft of the location of the tubes. Still another energizes the coils in the cars, which coils provide the powerful repulsive force that neutralizes gravity and allows the cars to remain suspended either when stationary or when in motion. But the method of propulsion is what makes travel at extremely high speed impossible."

"But Jimmy, the trip is made in about six hours. Surely that is fast enough for anyone."

"No, dear, it is not fast enough under present traffic demands. Of course the cars travel much faster than the standard aircraft but with my scheme they can be made to operate at five or possibly six times their present velocity. You see, as it is now, the tubes are filled with air at atmospheric pressure and the cars are drawn though this medium by means of motor-driven propellers as on the standard planes. It is the friction of this air that makes higher speeds impossible and it is the removal of the air that was the basis of my original investigations."

"You are being a little too technical for me," laughed Doris, "but I think I get a fair idea of what you are talking about. And it really is interesting. How is the rest of it done?"

"By superimposing certain other frequencies on the carrier waves that comprise the tunnel walls. These are the ones I have discovered and am now ready to put to practical use. The first of these causes almost complete evacuation of the interior of the tubes so that the air pressure is negligible. The other is a wave that provides the new propulsive energy for the cars. You see, it will no longer be possible to use the propellers, since there will be no air for these to work on. But my method will draw the cars forward by an inductive action that is capable of providing tremendous speeds. I am afraid I can not describe it to you because it can not be explained without going into great technical detail and that would bore you to extinction. The important thing is that I have my chance at last."

"Oh Jimmy, I am so glad," breathed Doris eyes shining with pleasure "and I know you will succeed. I just know it."

"I'm positive of it darling. And then I shall be in a position to speak to your father."

The happy face of the girl changed suddenly to one of complete dejection. She had forgotten about the recent edict of her parent. There was a catch in her voice and her eyes suddenly smarted with quick tears as she replied, "It is too late I am afraid. Daddy made me promise today that I would marry Ash Hoyt."

Jim Streeter went white. Here was something he had not counted on. "Doris!" he whispered, "You

promised definitely?"

"Yes, I promised Daddy definitely. But I asked for a month before making it definite to Ashley."

"Then there is still a chance, sweetheart. I believe I can have the first car operating in less than a month and when that is done I am sure that the publication of the results will bring your Dad to the point of listening to me. But I must get busy and no mistake!"

"Oh Jim, if you can only do it!"

The blue eyes of Doris Townsend once more gleamed with hope when, after a breathless leave taking, her energetic lover was gone.

CHAPTER II

Fears and Hopes

BUT Ashley Hoyt had not been idle and he soon learned from Jerome Townsend of the decision of his daughter. Elated as he was over the news, he was distrustful of the possibilities that might result from meetings between Doris and young Streeter. So he contrived the sending of a perfectly innocent-appearing invitation to Doris, an invitation from a dear girl friend who had recently wed and was living on the west coast, an invitation to spend a month with her during the absence of the newly-acquired husband on a business trip to Honolulu.

To Doris, who did not suspect the machinations which had brought it about; the invitation came as somewhat of a relief. She welcomed it and did not delay in accepting for, much as she would miss Jim, she would also be relieved of the attentions of Ashley Hoyt and Jim would be able to work uninterruptedly on the one thing that promised hope of their ultimate union.

And Jim worked as he had never worked before. When Doris had taken one of the night tunnel cars to San Francisco it seemed that something had gone from his life; something that was so precious that even the knowledge of her presence in the same city had been a comfort to him. But in her going he was spurred to still greater effort for he knew that in that effort lay his one chance of winning her for his bride. Day and night he labored and the officials of Air Tunnels Incorporated marveled at the vigor of this young man who had contracted to do the seemingly impossible for them.

In the big power plant of the tunnel terminal not far from Mineola, Long Island, he set up strange contrivances that were to produce the new energies in conjunction with the old. The great turbine-generators had sufficient capacity to take care of the extra load that was to be imposed on them and in this Jim was extremely fortunate, for much time would have been lost had it been necessary to arrange for the purchase of extra power from one of the public utilities. But many changes were necessary in the switching equipment. New bus structures must be erected to carry the heavy currents required by the additional equipment. Additional cables must be run to the top of the tall steel towers from which the energies were projected across the continent. And in this work he was ably and cheerfully assisted by Paul Lockhardt, Resident Engineer of the Company.

"Paul," he said as the two bent over a drawing board late one night of the second week, "I believe we are going to be ready in time. Our electrical connections are completed as far as the power plant is concerned and all of the new apparatus is tested and in shape to operate. All that remains is the altering of the car and I have a hunch that we have plenty of time for that."

"If there is nothing more than the changes shown on this drawing it is a cinch," came the encouraging reply, "I'll guarantee we can have it ready in ten days."

"It means a lot to me, Paul."

"I know it does, though you haven't told me why it is necessary that we be ready in so short a time. And I'm with you to the bitter end, old man."

"Thanks. You've been great and I can't tell you how I appreciate it. When it is all over I'll tell you why the short time is so important to me."

"This is a wonderful thing you're doing, Jim."

"Do you believe in it?"

"You bet your life. Why, I don't see a flaw in the whole thing. Your models have demonstrated it."

"I am pretty confident myself, but of course there is always the possibility that something will go wrong when an attempt is made to duplicate on a large scale that which has been done only in the laboratory. Here we have, extending from a point over our heads, a tube of etheric vibrations that is twenty feet in diameter and more than twenty-five hundred miles in length. It bows upward in a huge arc that is formed by the repelling energies radiated by the plants in Illinois and Colorado. More than four billion cubic feet of air must be removed from this tube by our 'R' energy and a vacuum of 29.8 inches of mercury constantly maintained. It is a big task."

"Yes but, Jim, it is proved by mathematics. It is merely a question of supplying a proportionately greater amount of the energy than is required by the models. And the 'S' energy can not fail to produce the desired propulsive effect. How can it fail?"

"Oh, I am merely arguing against myself. I am not fearful of the results but I wish to go over the thing very thoroughly in my mind, and many times too. The 'S' energy, as you know, is a comparatively simple thing. It travels along our carrier waves at the speed of light and its influence on the coils we shall install in the car is that of drawing the car through the tunnel by the interaction between its own energy and the local energy in the coils. The speed is controlled by adjusting the local frequency in step with the desired harmonic of the 'S' energy. In other words we are utilizing a sort of a heterodyne effect between the two energies. You might say that a beat note is produced and that the speed of the car depends on the value of this beat note. We can jump from one octave to another until a simply impossible speed might be obtained. My calculations show that a speed of three thousand miles an hour is not at all unlikely with one of the standard cars operated in the extremely low density of air we are to utilize."

They both fell silent for a time musing on the wonders of the experiment on which they were working and on the annihilation of distances that was to result. It was incredible that an air-tight metal car, eighteen feet in diameter and more than fifty feet in length, could be hurled across the continent or across an ocean at such terrific speed. Yet it was only a little less than thirty years since the record for the transcontinental air flight was something over seventeen hours. And it was a bare four years since the air tunnel itself became a possibility with its record of six hours for the journey. Truly there seemed to be no limit to the possibilities of science.

Jim was first to rouse from the reverie. "Paul," he

sighed, "I'm tired. What do you say we go home?"

"Right. And don't worry about the experiment. I'll make a bet with any one living that it works at the first try."

"Hope your right. And I wouldn't bet against it, Paul. I am really sure in my own mind. My only real doubt is of reaching full success in that time I have set."

Arm in arm they left the station and they paused for a while between the two steel towers from whose tips, two hundred feet above their heads, there streamed westward the two orange beams that were the east and west bound air tunnels. Steadily shone these emblems of progress, their color of night warning to standard planes and dirigibles forming two great pencils of light that disappeared in converging perspective in the direction of Manhattan Island. They watched a car that had just come whirring in from the coast and ground into the cradle at the top of the tower. They watched as it was lowered to the earth and run onto the siding amongst hundreds of its fellows, there to discharge freight and its passengers before the inspection and overhauling that preceded each return trip.

Then the two men trudged silently in the direction of the small hotel where they had been staying during their intensive labors. Even after nearly four years of operation, neither of them had become quite accustomed to the marvel of the air tunnel and now, as they contemplated the still greater wonder that was to come, they were unusually thoughtful regarding the amazing accomplishments of science.

Sudden Tragedy

TEN days later Jerome Townsend was spending the evening at home, indulging in his favorite pastime of matching his wits against a worthy opponent in a game of chess. His elbow rested on the table and he carefully studied the situation just brought about by a clever move of his opponent, Ashley Hoyt. That smiling individual regarded his prospective father-in-law with triumph. It was checkmate!

The bell of the library telephone jangled insistently and, with an annoyed grunt, Jerome Townsend arose to answer the call. What was his surprise on lifting the receiver to learn from the operator that San Francisco was calling. "My God, Ashley!" he exclaimed, "Something must be wrong with Doris. I have just had a letter from her and there can be no other reason for this call excepting trouble."

And when the connection was completed, he went white. For on the face of the girl that stared at him from the little square screen over the mouthpiece of the combination television phone there was an expression of agony. "Margaret!" he gasped, as he recognized the friend of his daughter, "what is wrong?"

"It's Doris!" she exclaimed, between sobs, "She's dreadfully ill and we rushed her to the hospital in San Francisco. She has some terrible disease. The doctors say there is only one physician in the world who can save her life!"

A great fear clutched the breast of the listening man. "Why—why Margaret," he stammered, "this must have happened very suddenly. What on earth is it? And who is this doctor?"

"Oh, it did happen suddenly, Mr. Townsend. It is some dreadful infection that is extremely rapid in action—almost always fatal, they say. And Doctor Mowbray is supposed to be the only man who knows anything about its cure."

"Doctor Mowbray? Oh yes, I know of him. And he is right here in New York. I'll get him there by tunnel if it costs me a hundred thousand dollars. This is terrible!"

He mopped his brow in agony of mind and Ashley Hoyt stood helplessly by. The girl in the distant city shook her head in despair.

"But Mr. Townsend," she said hopelessly, "they say that she has but three or four hours to live. And Mowbray can not possibly reach here that soon, even through the tunnel."

"Oh, my God!" groaned the stricken father, "can nothing be done out there?"

But the girl's face had vanished from the little square of light and there was a confused impression of people rushing about at other end of the wire, their images out of focus. Jerome Townsend shouted frantically into the mouthpiece to no avail. Then a face came into focus, a kindly but solemn countenance that was unfamiliar to the observers.

"I am Doctor Wright," spoke a serious voice, "Mrs. Jennings has fainted. And small wonder. Your daughter is desperately ill and all that has been told to you by her friend is gospel truth. This infection is one of the most dreaded in the medical profession. *Streptococcus hemoliticus*. It progresses with extreme rapidity. Breaks down the blood—no remedy until very recently when Mowbray discovered a serum—hopeless without it and him."

The terse pronouncements impressed themselves indelibly in Townsend's tortured brain. "But—but," he moaned, "Three hours. That is impossible. Is—is there no chance that she might hold on for say seven hours? I believe we can have Mowbray there by then."

But the reply brought little comfort. "About one chance in a million. You can try if you wish. But I greatly fear it will be of no use."

With a cry like that of a wounded animal, Jerome Townsend replaced the receiver on its hook. "We must try, Ashley!" he cried, "It is the only chance and nothing must be left undone."

In a moment he had determined the doctor's telephone number and was madly trying to raise the operator. It seemed she would never answer. And the seconds seemed hours as he waited for the reply from the number he had called. Fortunately the great physician was in his office and when the circumstances were explained he was not long in agreeing to make the trip across the continent in the effort to save a human life. The price was high but the distraught father would not have hesitated at twice the amount. Arrangements were quickly made and the two men in the luxurious Townsend apartment hastened to the landing stage on the roof where they would find the speedy little biplane that would carry them to the tunnel terminal where the doctor had agreed to meet them. When they reached the open air Townsend's knees almost gave way and it was necessary for his friend to assist him into the little two-seater. In less than a minute they had taken off and were headed toward Mineola.

A Single Chance

IT was well past midnight. Jim Streeter and Paul Lockhardt stood at the upper platform of the westbound air tunnel tower, anxiously awaiting the radio message that was to inform them that the last night car had reached San Francisco. It was the night of the test of Streeter's invention and an interruption to regular service had been arranged for so that the trial of

the first car could be made. The tunnel must be clear before they could evacuate it of the air required for the operation of the standard cars.

Jimmy looked at his watch impatiently. "Must be nearly time, Paul," he said, "That last car left at 6:15 and it is now 12.18. What do you suppose is wrong?"

"Nothing," laughed his friend, "Take it easy. They often take six and a quarter hours, you know."

Duncan Moore was on hand to witness the test, as were several other officials of Air Tunnels Incorporated. They smiled at the eagerness of the young inventor, yet each was secretly awaiting the word from the radio room with keen anticipation. Far beneath them hummed the great generators that would lower their tone when the new energies of Streeter's were turned into the westbound tunnel. The specially equipped car was in readiness at the mouth of the tunnel and the huge hoop that had been erected to seal the entrance against air leakage by means of a wall of vibrations was connected to its feeders. Not a thing had been overlooked.

Then there arrived on the platform three excited men who had not been expected. Ashley Hoyt rushed to the side of the surprised Duncan Moore and hastily presented Jerome Townsend and Doctor Mowbray. Their story was quickly told and Jimmy listened with close attention that quickly congealed into a deadly fear. His Doris was at death's door!

"There is no time to lose, Mr. Moore," sputtered Townsend, "we must have a car at once. Even as it is the six hour trip is far too long and it is almost certain we shall be too late. But we must make the try."

Duncan Moore stared meaningless at young Streeter whose face was a tragic mask. "We are about to test Streeter's invention," he said, "and, if it is as successful as we hope, you can be assured of reaching the coast in time. That is, if you are willing to make the initial trip in the experimental car."

"Stuff and nonsense!" exclaimed Hoyt angrily, "the thing will never work. We must have a standard car at once!"

"What's this?" asked Townsend, "What do you mean—we can reach the coast in time?"

"Streeter's invention is supposed to permit of making the trip in hardly more than an hour."

"Ridiculous!" snapped Hoyt, "He's an impostor. I insist——"

But he was interrupted by Jerome Townsend, who suddenly saw a gleam of hope. "An hour you say?" was his excited question, "You believe in this invention, Mr. Moore?"

"Absolutely," smiled the calm official.

"Then, by thunder, we'll chance it!" boomed Townsend, "What do you say, doctor?"

Undecided, Doctor Mowbray looked from one to the other of those faces that radiated such tense emotion. "I'll go," he said simply. And Jimmy Streeter could have hugged the rather shabbily dressed, awkward man with the little black bag

"Count me out," said Ashley Hoyt sulkily. And by those words was his doom sealed as far as Jerome Townsend was concerned.

At that moment the loud speaker on the platform spoke its message from the far west, "All clear! Tunnel evacuated!"

Jimmy quickly bundled his passengers into the waiting car. There were but the four, Jerome Townsend, Doctor Mowbray, Paul and himself. Townsend gripped the hand of the inventor as a drowning man grasps a straw. Then he sank weakly into one of the cushioned seats and closed his weary eyes. Jimmy fumbled with the bolts of the door as he strove to clamp it tight in the shortest possible time. Then, when he had taken his place at the controls, he sent up a silent prayer for the success of his brain child. He spoke rapidly into the black disc that carried his voice to the power house below and to the watchers on the platform.

"The end wall energy," he ordered. And, though it was not possible to see to the rear, he knew that the tube mouth had been stoppered by the vibration wall. This was shown by a small indicator on the panel above the controls.

"Now the 'R' energy," he repeated. There was a hiss that could be plainly heard through the double walls of the car and a mercury column on the panel instantly indicated a decrease in the air pressure outside the car. Quickly the mercury rose in the glass tube and when a vacuum of twenty-eight inches was indicated he could wait no longer.

"The 'S' energy now," he intoned. There was a tremor that set the car throbbing rhythmically and he exulted in the knowledge that all was well thus far. "Now," he shouted into the microphone, "*Au revoir* all. We're off!"

At his manipulation of the synchronizing control there was a slight shock and the sensation of a quick motion forward. By the indication of the mercury column their car was in a vacuum of more than twenty-nine inches. The needle of the speed indicator was moving rapidly to the right of its scale as the car gained in velocity. One hundred miles an hour. Another notch on the synchronizing control and it mounted still more rapidly. Two hundred, three hundred, five hundred miles per hour, and still it rose. The acceleration was terrific and the passengers were pressed so tightly to the backs of their seats as to find it almost unbearable. There was no sound save the clicking of the mileage recorder and the labored breathing of the passengers. The energies themselves were silent in action and the absence of air friction against the outer walls of the car eliminated the usual deafening roar produced in passage through the tunnel.

"Success!" gloated Jimmy, "We'll save Doris yet, Mr. Townsend."

"Thank God!" murmured the heart-sick father, eyes still closed.

And Paul gripped the hand of the inventor as the speed increased steadily toward the point that indicated three thousand four hundred miles an hour. Ahead of them stretched the glowing inner wall of the tunnel, ever rising to a great altitude to carry them over the mountains they must cross on the way. Only the mileage recorder told them of their position. And with the synchronizing control at maximum position no further attention was required on the part of the inventor. The energies in the tube wall accomplished everything necessary, support, propulsion and guidance.

Then the doctor spoke for the first time since leaving on this most astonishing of journeys. "Gentlemen," he stated, "I must ask one of you to submit to inoculation with the new anti-strep serum. Which of you younger men will volunteer?"

Jimmy bared his arm in an instant. "Take me, Doctor," he begged, "You see, I love Doris Townsend too."

"Thank you Jimmy," said Jerome Townsend, "you'll

not have cause for regret."

"It will mean a blood transfusion as well," the doctor continued. "This serum is successful only if administered to a healthy person some time before the operation that carries the antitoxin into the veins of the patient. It has no effect if administered direct since its curative properties are released only after acting for a considerable time on healthy corpuscles which are in this manner prepared for the battle against the infection in the blood of the patient. You must give twenty-four ounces of your blood when we reach the girl who is suffering with the dread malady."

"Shoot, Doctor," came gladly from the lips of Jimmy Streeter.

The Operation

IN precisely one hour and three minutes from the time they had stepped into the car the four men jumped to the platform of the terminal on the outskirts of the western city. Photographers and reporters were there to greet them and the news was flashed back to New York with no delay. But the four men had no time for the demonstrations that had been prepared. They rushed to obtain a fast plane to carry them to the dying girl and were in the hospital where she lay before eleven o'clock Pacific Time—just a few minutes more than two hours after Jerome Townsend had received the dreadful news.

"Can we see her?" asked the father of the astonished hospital authorities when their mission had been explained.

"No reason you shouldn't," replied the surgeon in charge. "She is in a coma and is incapable of being disturbed. But I must warn you to expect a shock at her appearance."

Doctor Mowbray was already in consultation with the physicians who had handled the case and preparations for the blood transfusion were made at once. Paul elected to remain in the waiting room as he felt that his presence in the room of the patient was unnecessary and indelicate. Jerome Townsend and Jimmy were conducted to the girl's room immediately and they did indeed receive a shock when they gazed upon her still form.

As white as the covers was her face and delicate traceries of blue veins showed in startling relief against the whiteness of her hands where they lay immobile outside the covers. Her head, covered by ice packs, was well nigh hidden from view but from beneath one of the rubberized bags there peeped a huge swelling where the infection had partially localized in one of the glands of the neck.

"Oh! my God!" groaned Jimmy through palsied lips. And Jerome Townsend, speechless, grasped the bed post for support.

Busy internes entered to prepare the girl for the operation and Jimmy was requested to report to a nearby room to be prepared for his share in the attempt to save her life. Her father, relegated to the waiting room, paced the floor in an agony of mind such as he had never experienced since the loss of the girl's mother, some fifteen years before. And when the silent form of Doris, all covered by a spotlessly white sheet, was wheeled past the door on the way to the operating room he nearly collapsed. Paul Lockhardt did his best to console and comfort the panicky father, but to little avail. Then Doctor Mowbray entered the room.

"Cheer up, Mr. Townsend," he advised cheerily, "we have arrived in plenty of time and I can assure you that all in my power will be done to save your daughter. But you must be patient as it might require as much as a half hour."

"You—you think she has a chance?"

"Undoubtedly. And an excellent one, too. This young Streeter is a perfect physical specimen and ideally suited for my purpose."

The great physician hurried in the direction of the operating room and Jerome Townsend slumped weakly in a chair, still trembling but unutterably relieved in mind. He would reward Jim Streeter! When Doris recovered. Ashley Hoyt had played the cad at Mineola.

But when the half hour expired and there was still no news from the operating room he once more commenced his nervous pacing. What if something had gone amiss? True, Mowbray was a great man. But even the best of these doctors erred sometimes. Thirty-five minutes! Forty! Would they never finish? He walked the floor like a caged animal, Paul Lockhardt at his heels constantly, fearing the older man would swoon or burst into the operating room in his agony of spirit. They halted at the door of that dread chamber and the father listened intently for sounds from within. But all was as silent as a tomb. Was it a tomb? Townsend groaned aloud at the thought. Fifty minutes! Then there came a stir from within and a white-capped nurse opened the door.

"The patient is in satisfactory condition and the operation was a success," she replied to the anxious query of the pale and trembling father. And it was necessary for Paul to support him on the return to the waiting room.

Then came the perspiring Doctor Mowbray and he laid a hand on the shoulder of the suffering Townsend. "Sorry I couldn't keep my word regarding the half hour," he said kindly, "but it was necessary to make a slight incision below the ear in addition to the transfusion. The blood count shows a terrific infection but an equally terrific resistance. I believe the girl is going to get well."

"Thank God! Oh, thank God!" exclaimed Townsend. And the great physician turned quickly from the anguish that still twisted his features.

Reward and Punishment

ASHLEY HOYT reached San Francisco the following morning, having taken one of the regular tunnel cars. He was accompanied by three officials of Air Tunnels, Incorporated, including the doughty chairman, Duncan Q. Moore. Knowing of the conditions that would keep Jim Streeter on the coast for several weeks, the officials had come to congratulate the young man and to sign with him a perfectly staggering contract, one that would make him more than independent for life. But Ashley had come for a different purpose.

They quickly learned at which hotel Mr. Townsend was stopping and hastened to visit him there. Upon inquiring regarding the condition of the daughter they were told that it had been reported as satisfactory that morning and that young Streeter was to be discharged from the hospital within a few hours. Ashley Hoyt scowled disdainfully when he learned of the action of his rival. Just one more of his gestures, he thought. But he would outwit him if he thought he was going to win Doris by any such methods! He would show them all!

Having registered at Townsend's hotel, the officials awaited further news and the coming of Jimmy

Streeter. But Hoyt kept to himself in the solitude of his room. He would bide his own time!

Jimmy, a bit pale, and a much worried young man, greeted Duncan Moore and the other two officers of the company with little enthusiasm. True, he was startled considerably at the offer made to him. A million in cash for his invention, a royalty on every car equipped, plus a permanent position at the salary of fifty thousand a year, was far more than he had expected. But Doris was still reported on the danger list and he signed the papers apathetically. The officials were pleased beyond measure and, following a few words of sympathy, prepared to return east that night. They did not consider Ashley Hoyt. And Jimmy was not even aware of that gentleman's presence on the coast.

Day by day the reports from the hospital were the same. Doris was holding her own but was still out of danger. Always was her condition reported as satisfactory. Satisfactory! Jimmy and Jerome Townsend hated the word, but it was about the best they could get from the suave hospital attendants. They waited miserably day by day, doing their best to console each other, and in those trying hours a close bond of friendship sprang up between Jerome Townsend and the younger man he had so lately reviled. But nothing was said about the possibility of a future family relationship. Nor did Jimmy speak of his new contract.

Doctor Mowbray and Paul had returned east. There was nothing further the doctor could do, and Paul was needed out at Mineola. Ashley Hoyt kept himself hidden from sight. He too was in touch with the hospital each day—biding his time. But neither Jimmy nor the girl's father knew of his presence.

Then came a day when they were told that the patient had taken a definite turn for the better. Jerome Townsend sobbed his relief and Jimmy danced an extremely undignified jig. They could visit the patient tomorrow!

The visit to the hospital was brief but the two men returned to their hotel overjoyed. Doris had not known of their presence for she was sleeping. But it was a natural sleep now—not a coma—and the reports of the physicians were overwhelmingly encouraging. Her temperature and pulse were scarcely above normal. Respiration normal. Blood counts and cultures showed rapid subsidence of the infection. She would recover.

But their joy was short-lived, for they had no sooner entered Townsend's room when there was a rap at the door. The visitor was none other than Ashley Hoyt and Jimmy glared malevolently at the coolly confident intruder. The older man was speechless.

"Hello, Mr. Townsend," calmly spoke their unwelcome visitor, "I understand that Doris will recover. And I have come to remind you that the thirty days have more than passed. Doris' promise to you must be kept. She must with her own lips make its definite to me as soon as she has recovered sufficiently."

"Why—why—you rascally scoundrel!" sputtered Townsend. "After your actions at Mineola you should be ashamed of yourself to even think of such a thing. Had we listened to you instead of Streeter here, Doris would now be in her grave. Get out of here before I kill you!"

"Now, now, Townsend," was the silky reply, "keep your shirt on. Remember that if I withdraw my support from your business it means immediate failure. You will be penniless. And I shall certainly do just that unless Doris keeps her promise."

The older man, suddenly white-lipped, sank into his chair. Jimmy could scarce keep his hands from the collar of the faultlessly tailored coat of the speaker. He longed to throw him from the room—down the stairs if there were any such handy. But suddenly he thought of his contract.

"How much money does this involve, Mr. Townsend?" he asked.

Hoyt replied, "Five million dollars, my good friend. Put that in your pipe and smoke it. You can raise but a fifth of that even with your new invention approved. And I swear that Doris Townsend shall marry me. Otherwise her father is a ruined man."

Jimmy gasped. Five million dollars! That was a lot of money! He glanced at the figure of the harrassed father of his beloved Doris—saw that he had hunched miserably in his chair, head buried in his hands. Hoyt smiled mockingly.

But the door had opened silently and a second visitor stood within its portals. He too smiled, but it was a smile of understanding and satisfaction. "Good evening, gentlemen," he remarked softly.

All three turned startled eyes in his direction. "Duncan Moore!" gasped Hoyt.

There was a moment of tensed silence.

"Yes, Duncan Moore!" The reply was snapped at Hoyt like the crack of a whip. "And I now have you where I want you, Ashley Hoyt. I returned unexpectedly, wishing to consult with Mr. Streeter regarding certain important matters. I did not intend to eavesdrop, but your voice was so loud that I could not help but overhear the entire conversation. And I tell you now I shall personally replace the financial backing you have previously provided for Mr. Townsend. I shall put up these five millions of which you prate and which you are using as a club. Your little game is over and, further than this, I now demand your resignation as a Director of Air Tunnels, Incorporated."

He turned to Townsend, whose face shone with delight. "Shall I kick him out for you?" he inquired.

But that stringent action was unnecessary, for at the words the erstwhile domineering young man fled precipitately into the corridor. The laughter of the three men in the room followed him as he ran.

"Now about these plans," said Duncan Moore, all business at once.

But Jimmy, for the moment, paid no attention. He was engaged in clasping the hand of Jerome Townsend—hard. They had whispered of the different promise that Doris would make when she recovered. In their eyes was wordless happiness.

THE END.

BACK NUMBERS

The first issue of SCIENCE WONDER STORIES was the June number.

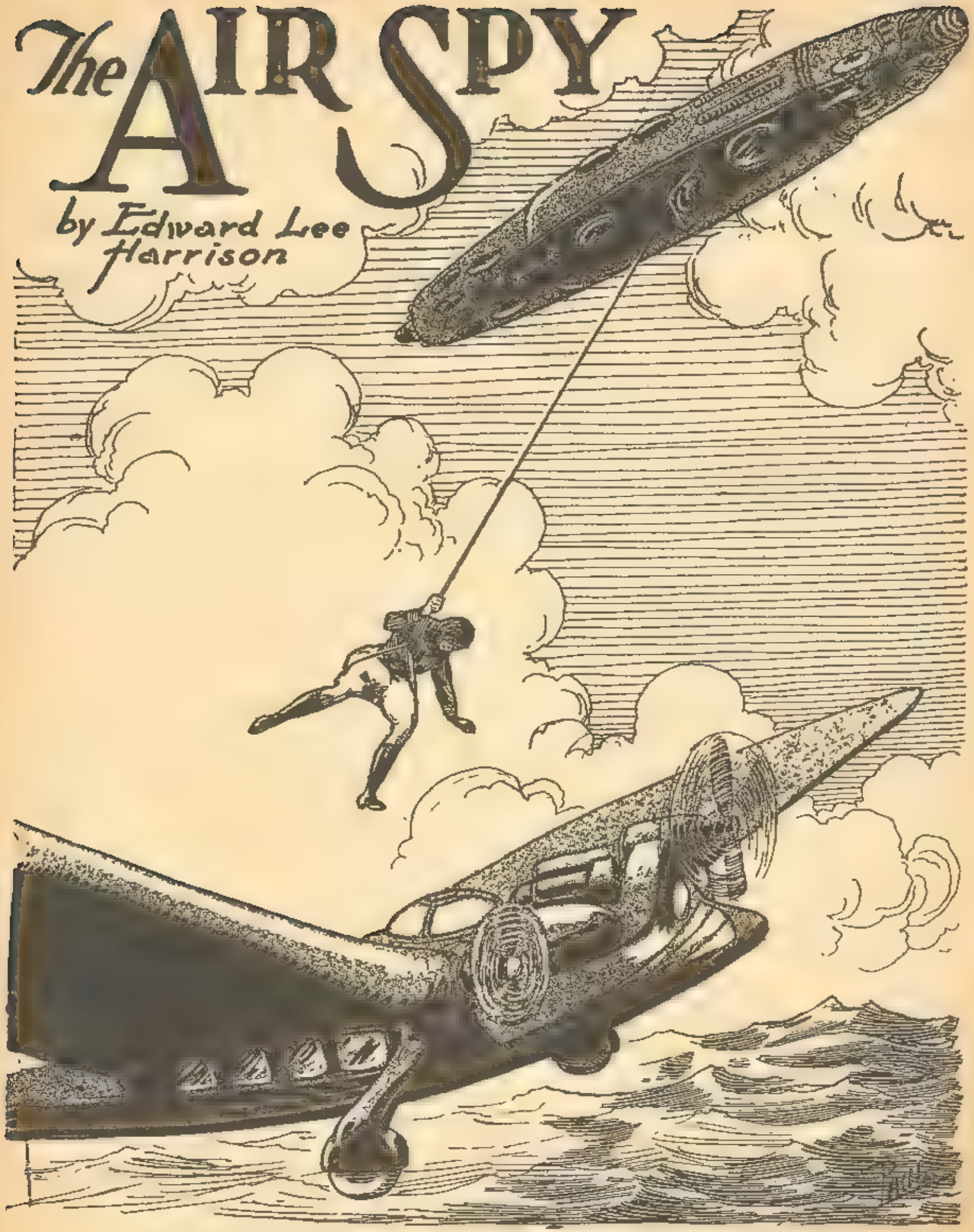
All back numbers can be supplied as long as the supply lasts, at the rate of 25c a copy, sent prepaid to any address

STELLAR PUBLISHING CORPORATION

96-98 Park Place New York

The AIR SPY

by Edward Lee Harrison



Lifted clear of the great vessel, the little device with its human freight swung far astern in the fierce rush of the air. The passenger's whole attention was riveted on the black craft below.

WHEN Lieutenant Von Holst entered his car and told the chauffeur to drive to the Aero Club, no one could have guessed from his manner that he was eluding arrest and detention at the hands of the United States War Department officers.

His great caution and tact had for nearly a year preserved his identity undetected, and he was on the eve of departure for Euravia with complete details of the new Aerial War Fleet in his possession when an unforeseen accident had led to his detection.

As he rode toward the Aero Club he cursed the trivial slip that had upset all his carefully laid plans and made him a fugitive spy, with only his wits to preserve his liberty, and possibly his life.

He had sent two letters the day before, one to his confederate, Courtney, and the other to the State Department. His secretary had, in some inconceivable way, slipped them into the wrong envelopes, with the result that secret service men had been detailed to effect his immediate arrest as a spy. It was due to a telephone message from a friend in the Department that he had escaped for the moment with the briefest of farewells to his wife.

Reaching the Club, he passed hurriedly to a private room where a tall, keen-featured man sat thoughtfully smoking a cigar. At sight of Von Holst's face, the smoker sprang from his chair and exclaimed: "For Heaven's sake, Von, what in the world has happened?"

"The jig's up, Courtney," said the emissary, wearily. "Order out your yacht as soon as you can; I'm in peril every moment."

A few moments later, on the roof of the Aero Club, Von Holst stepped aboard the wealthy clubman's private air-yacht, *Pegasus*, and shot eastward into the deepening twilight.

Five minutes later, the commander of the United States Aerial Patrol *Petrel* which was tuning up off the Charleston hangars, was rudely aroused from his reverie by the sharp snap of the pneumatic tube at his elbow.

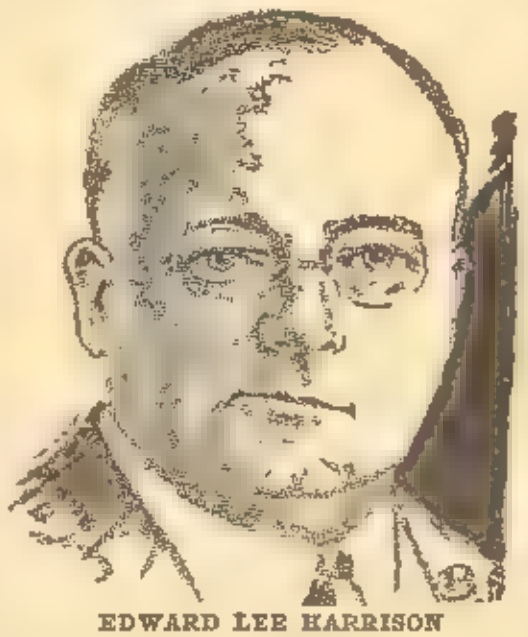
Leisurely he picked up the transmitter, extracted the wireless message, and read: "Von Holst, Euravian spy, tall, dark, blue eyes, scar on cheek, reported to be on board aerial yacht *Pegasus*, bound for Lisbon. You are to apprehend him and return him to Washington."

Commander Holder's first thought as he laid the paper down was not of the opportunity offered to gain distinction by the capture, but of annoyance that the mission would interrupt his plans for the evening with a certain young lady in the city.

"Well, it can't be helped," he said aloud presently, "so here goes." He pressed a button and his first lieutenant entered the room.

"Struthers, I have just received a wireless that there is a hawk abroad; get the engines going and order the operate to locate the yacht *Pegasus*—her serial coil is"—and for a moment he scanned a small list on his desk—"Number six thousand and nine."

The lieutenant saluted and withdrew, and the Commander quickly drew a wireless pad toward him and wrote: "Dear Marion, called away on important official duty—cannot keep engagement—will wire later." Thrusting this into the tube, he turned to the universal indicator on the table; this showed the *Petrel* to be three miles off Charleston, at an elevation of two hundred feet above sea level, maintained at this elevation by her auxiliary propellers, while the main ones were being overhauled.



EDWARD LEE HARRISON

As he looked up from his scrutiny, the first lieutenant entered, saluted, and reported, "The operator reports the *Pegasus* to be one hundred miles due east, and the engineer says it will take twenty minutes to complete the necessary adjustments to permit driving."

Without reply, the commander turned to the tube and spoke rapidly: "MacLean, get into action as soon as possible and drive due East on the transatlantic circle to Lisbon. This is a government emergency order."

Turning to the waiting officer, he laughed and said: "Struthers, they say there's a big reward out for this bird; what will you do with your share?" The lieutenant grinned expansively: "Guess I'll take a lay-off and go back home." The captain laughed. "I'll bet there's a girl back there as an attraction." And Struthers flushed and said nothing.

The giant hull of the *Petrel* began to vibrate noticeably by this time, and the first lieutenant withdrew to arrange the details of their flight. Darkness was settling down, and the night threatened to be thick and foggy.

QUITE frequently, we read in the newspapers hysterical outbreaks from ambitious newspaper writers, who should know better, stating that with the advent of the cheap airplane, crime will be on the increase and that the crimes now carried on with the aid of the automobile, will be matched and increased through the instrumentality of the airplane. And while it is perfectly true that crime will always be with us, we are certain that science will find a way to checkmate the criminal of the future. And though it would seem offhand that the airplane will lend itself to crime yet, with instrumentalities such as the radio, it will be possible in the future to make the search for criminals more impressive than it is to-day with the automobile. Lindbergh himself recommends that all planes should be equipped with radio in the future, and we are certain that this will be done. The present story treats on this subject in a most interesting and enlightening manner.

A Third Takes Off

THE commander watched the indicator; it showed seven hundred feet elevation, which, presently, became twelve hundred—fifteen hundred—two thousand. At this point he could hear the sound of the steel gliding planes being set, and the great ship began to incline slowly until her prow pointed downward at an angle of forty-five degrees to the Atlantic.

Then, with a mighty, sweeping rush, the great

vessel plunged eastward through the darkness. The heavy steel planes vibrated and hummed as she hissed downward, gradually assumed horizontal flight, and at last rose, describing a mighty arc through space, a full hundred miles from start to finish.

Within the pilot house, Commander Holder bent over the glass dial which indicated their position: "Only another hundred miles, and then—" he straightened up and finished—"We will see."

The grizzled old pilot who sat at the controlling plate and held the lives of all on board in his hands, sat with his eyes steadily fixed on the path of light the powerful searchlight cut through the darkness, occasionally glancing at the dials in front of him, and shifting some lever. Suddenly a sharp exclamation burst from his lips, and the next instant the great craft swerved perilously, throwing the captain across the room, while at almost the same instant a terrific shock was felt, and the ship staggered dizzily.

"What was that?" gasped Holder to the pilot, who was gazing intently at his indicators. "Near collision," he answered briefly. "Some pirate showed no light." With a fervent prayer that no second misfortune of this nature would overtake them, Holder returned to his cabin and bent over his chart, while with the roaring sea beneath and the swirling storm clouds above, the *Petrel* swept eastward through the night.

Meanwhile, Madame Von Holst had not been idle. The instant her husband drove away toward the Aero Club, she summoned her chauffeur and directed him to drive to an address in the outskirts of the city.

Here she knocked in a peculiar manner at the door of a ramshackle old house, which presently opened, and a grizzled, sunburnt old man looked cautiously out.

Instantly he cried joyfully, "Madame Von Holst, dis iss indeed a great pleasure; enter, enter."

Madame Von Holst hurriedly stepped inside, and without noticing the proffered chair, began excitedly: "Fritz, how is your airship?"

She seemed to fairly hang on the old man's slow reply, "She iss flying neffer so good," he began jubilantly. "She iss—"

"Could you fly in half an hour?" she broke in anxiously.

The old man looked at her in dull amazement, but finally said slowly, "In an hour, yes—not sooner."

"Hurry and get ready to go, Fritz," she implored feverishly. "My husband is leaving for Europe; he has been discovered and is pursued, and I must warn him," she continued, almost wildly.

"Gott in Himmel!" cried the old inventor, his whole manner changing. "I will hasten." And he disappeared in the rear of the house. The moments seemed hours to the anxious wife, but in just forty minutes by her jewelled watch there was a whir of motors outside the door, and a strange looking craft rolled up to the gate.

In general appearance it resembled nothing so much as an immense black cigar. It was literally almost all machinery, there being scant room for three people in the front of the cylindrical body; the remainder of the space was devoted to the quadruple motors, using a new fuel. It was the idol of the old inventor, with which he expected to revolutionize the whole aerial world.

Madame Von Holst did not stop for preliminaries, but climbed into the tiny cabin; without a word, the gray-haired pilot turned his levers and with a rush, the winged machine rose in a sharp curve and turning a quarter circle, headed toward the broad Atlantic. So tremendous was the speed which the powerful engines imparted to the slender craft that in a few seconds those on land lost sign of her.

It was six o'clock when the *Petrel* made her start, and it was an hour and a half later when the *Spindle*, carrying Madame Von Holst, swept over the surf and headed for the open sea.

Full Speed Ahead!

ABOUT ten o'clock the lookout on board the *Petrel* reported: "Light astern, sir, seems to be overtaking us."

"What's that?" gasped Holder, staring at his subordinate. "Overtaking us? Are you crazy? Must be a shooting star," ironically. And with a superior smile he mounted to the observation tower, with a pair of night binoculars, listening meanwhile with a glow of satisfaction to the steady pulse of his triple-expansion engines. But his smile vanished as he gazed out into the night at the green and yellow light slowly crawling alongside, apparently about two miles astern.

"I would have wagered my last cent that no ship afloat could overtake the *Petrel*," he said incredulously to his lieutenant who had come up and stood by his side. "And I, sir," said the latter, with an oath.

But there was the evidence, and with a puzzled frown, the commander descended to the pilot house to impart the astounding news to the pilot, and to call through the tube to the engineer to "give her the last inch." The whir of the motors soon increased perceptibly, and the entire hull of the ship vibrated violently.

Back in the engine room the chief engineer watched his big engines with intense care, even anxiety. Not since the trial trip of the *Petrel* had such a terrific speed been maintained. The chief fear was concerning the propeller shaft which had already heated its packing box to the danger point in spite of all efforts to reduce the temperature. The boat was making three hundred miles per hour, average—a fast pace for a sustained flight.

However, he pushed the engines, turning the feed pipe wide open, and allowing the fuel to run as fast as the engines would consume it; his gauge read five hundred and thirty revolutions per minute, and soon pushed up close to the six hundred mark, whereas the normal speed would have been less than four hundred.

Again Holder's voice rang sharply through the tube: "What's the matter with you, MacLean, can't you speed her up?"

"Sorry, sir, doing every inch I can," returned the engineer, without emotion, and turned away with a weary air

Presently Holder came into the engine room and stood for some time watching the play of the sparkling engines. 'I'll tell you what we're up against," he finally said slowly to the engineer who had come up and stood silently by.

"Some craft—can't imagine what or why—is overtaking us yard over yard, and I don't like it; afraid it has something to do with this bird we're chasing."

"Well, sir," replied MacLean, "I'll tell you what can be done if necessary, but it's risky. We can gear the auxiliary propellers into action, but if she don't happen to strike the right gait at the start, we may snap the blades off the two now going."

"Let her go; gear her up," said Holder, decidedly. "I'll catch this bird or blow up, and I feel it in my bones that if this craft beats us to it, it will be all off."

MacLean geared his third propeller with all the care possible, and as the sharp crash of the clutch engaging the drive shaft smote their ears, the engine room crew held their breath in suspense.

For a few minutes there was a deafening roar from the propellers rushing at different speeds, but gradually this grew more rhythmical, and in five minutes the steady pulsing was renewed, only with increased volume, while the giant hull of the *Petrel* shook as though she would split her seams.

Back in the little *Spindle* things were not going any too well. For one thing, old Fritz had forgotten to fill the spare fuel tank and they had barely enough for a ten-hour run; how long the chase might last, no one dared to predict; to add to these worries, the oil in the searchlight had leaked out, and they were in danger of collision with some stray craft.

But the stolid old inventor nursed his engines tenderly and endeavored to maintain a speed that would bring them to the point where the tester indicated the *Pegasus* to be before the arrival of the *Petrel*, without undue waste of fuel.

Madame Von Holst sat tense and silent, her eyes fixed on the red, white and blue tail and sidelights of the *Petrel*, and her ears strained to catch the first sign that the wireless had come within radius of her husband's vessel.

Just as the *Spindle* began to forge ahead of the *Petrel*, the dial showed that communication of some sort was established. Feverishly she signalled: "Transcontinental"—"Transcontinental". Almost instantly, as the private password was sent, the reply came, sharp and imperative: "Who are you; what ship?" And she answered: "Spindle—Julia on board; must speak to Herzog."

After a moment's silence, the reply: "Herzog talking, what's wanted?" For an instant Madame Von Holst trembled, then with calm, sure stroke she sent her message: *"Petrel* overtaking you; escape impossible except with me; will take you on board in half an hour."

The reply to this was brief, almost curt: "No, you come on board *Pegasus.*" After vain efforts to get a reply to her query, "Why—why come on board?" she settled herself to wait the half hour with what patience she could command.

Search

AFTER a little while a faint green light appeared low down on the horizon. Evidently the *Pegasus* was flying low to avoid observation. In another ten minutes they would be alongside, so she hastily donned a waterproof coat, and dragged from the stern a long coil of thin steel chain, attached to which was a contrivance resembling the travelling seat of the life saving service.

Unhesitatingly she stepped into this and buckled herself securely against falling by means of heavy straps round the waist.

They were now directly above the *Pegasus*, and both crafts had slowed down considerably in order to effect the change of passengers. With a broken word of encouragement, and a face twisted by emotion, the old man opened the compartment door, and exerting all his strength, lifting his passenger clear of the little vessel, and the little car with its human freight swung far astern in the fierce rush of air.

But he eased the fall so gently that the occupant scarcely felt it, and soon all her attention was riveted on the black ship below, with its lights staring like the eyes of some huge monster. Old Fritz managed the cable by means of an automatic steel arm outside the body of the *Spindle*, and with his eyes fixed on the vessel below, he carefully brought the little car into line with the center of the *Pegasus*, and slowly lowered it. Suddenly a disk of light appeared in the center of the black mass, and as quickly disappeared, and he knew the daring wife had reached her husband.

"Light ahead," reported the first lieutenant on board the *Petrel*. "May be the *Pegasus.*" Commander Holder hurried forward to the pilot house. Half an hour ago the lights of the *Spindle* had disappeared in the distance in spite of the utmost his engines could do, and he had waited in an agony of impatience for this report.

Ordering the lookout to keep close watch, and report the moment they came within striking distance, the commander hastened to the gun room and ordered two marines to arm themselves with rifles and await orders. Placing an automatic revolver in his pocket, he went forward to the pilot house to see for himself the craft they had chased so far. There she was, not a mile ahead, showing black against the cloud-drifted sky, faint green lights showing from her rear port.

Evidently she had no intention of trying to hide; calling for the sling and tackle, the captain prepared to go aboard with his two marines.

The wireless crashed out her stern message: *"Pegasus,* ahoy; stand by to receive United States Patrol Inspector." The answer was curt: "All ready." Without a word, Holder and his two aids swung out into the night. They were met by a grizzled Euravian sub-officer, with a good-humored face, who welcomed them effusively and told them to make themselves at home; he also ordered scotch and soda and seemed disposed to make a purely social affair out of their visit

But Holder waved him impatiently aside and proceeded to search the ship thoroughly and with exacting care. He found nothing to indicate that Von Holst was on board; half a dozen engineers and machinists, with a cook and steward, comprised the crew, while the old officer seemed to be in sole command.

He stood for a while pondering, then his eyes fell on the bottom hatchway, which was not bolted up all around.

"Open that hatch," he ordered, and thought he detected the faintest trace of hesitation in the reply: "Sorry, Captain, but a careless steward lost both keys to that hatch last week, and I can't."

Holder was immediately alive with suspicion. "Pry that manhole open," he ordered sternly. The old man hesitated, but finally went off in search of tools, returning at length with two small chisels entirely inadequate to the task.

"Take those things away," roared Holder, "and bring me an axe." With a few vigorous strokes he tore away the bolts securing the hatch and with the assistance of one of his men, raised the heavy steel cover on its hinges; as it fell back it disclosed a circular black void, with the sea far beneath.

But to the keen eye of the inspector of patrol, it disclosed something else; something he had been looking for, and which gave him a keen thrill of exultation. Secured to a heavy ring in the circular frame of the manhole was a fine steel chain ladder which stretched away into the darkness, a slender, gleaming line leading down toward the black waves.

Reaching down, he gasped the chain, but his triumphant smile died on his lips as it came freely up in his hand. (*Concluded on page* 367)

The Ark of the Covenant

by Victor MacClure

A gout of flame shot up from the rise beyond the cemetery and a vast plume of smoke, at the root of which buildings seemed to part – rent and shattered. The airship shook to a tremendous report.

THE ARK OF THE COVENANT

What Has Gone Before

In Part 1, we learn of a series of mysterious robberies of banks throughout the world, the stealing of securities and gold from them and occasionally the leaving of radium. It is found out later that the raiders are from an airship, "ARK OF THE COVENANT." The raiders have stated that their purpose in the attacks on the cities is to end war.

James Boon, an inventor of a new airplane, and Dan Lamont, a scientist friend, are commissioned by the President of the United States, Benjamin Whitcomb, as special agents as part of the world-wide search for the raiders. Together with Boon's mechanic Mallken, the two men search for the bandits in their airplane the MERLIN. After locating it they attempt unsuccessfully to destroy it. The world meanwhile is in confusion due to the effect on commerce of the raids. The three men finally land in South America chasing the airship and on a mysterious Plateau of the Red Scar in the interior, they are captured by a band of men, the leader of whom Boon recognises as a man he met at the White House, an English naval officer, named Sholto Seton.

In Part 2, told by Sholto Seton, we learn how three years before in South America Seton meets a man of mystery whom he learned to call "the Chief." 'The Chief' enlists Seton in an effort to end war. In the interior of Brazil under the Plateau of the Red Scar, they gather together a picked crew of men, build two airships 'THE ARK OF THE COVENANT—I and II' and begin raids on the world's commerce in order to force it to recognise their power and therefore bring it to terms. The story by Seton tells of the experiences of the raiders up to the time that Lamont and Boon are captured on the Plateau.

"The Chief" has discovered under the Plateau a new gas, lighter than hydrogen, which can put people to sleep and tarnish gold. They have also discovered a great supply of a radium compound. The gas is used to manoeuver their airships and to put to sleep the people in the districts that they raid. They also have a ray which puts out of commission temporarily the engines of any motor car, airplane or the circuit of any electrically-propelled vehicle.

Continuation of the Narrative of James Boon

DAN LAMONT and myself were neatly trapped. We found ourselves looking down the muzzles of three rifles and a pistol, the latter held by Sholto Seton.

It would have been useless to give way to my first impulse, which was to pull my gun. I calculated the chances of shooting, but it was certain that the men facing us were putting up no bluff. Surprise and anger robbed us of speech, and for a moment or two Dan and I faced the threatening muzzles without a word, our hands in the air. Seton stepped aside and quickly deprived us of our weapons. I found my tongue then.

"So," I said hotly, "you are the leader of the damned pirates, after all!"

"If you like to put it that way," Seton replied quietly, "yes. You may put your hands down now."

VICTOR MacCLURE

I thought of the kindness that Seton had received from Kirsteen Torrance and Lord Almeric, of the friendly reception of him at the White House by the President, and I choked with rage. I took a look at Dan, and from the whiteness of his face I could see that he was sharing my feeling. But we said nothing further.

It looked as if our capture had been fully expected by the other side. The movement on the part of Seton's men was just about automatic. They closed in on us, and our eyes were quickly bandaged. We were ordered to march.

For a yard or two we were directed through scrub, then we found ourselves descending some rough steps. From the air and from the sound of our feet as they crunched on the rock under us, it was evident that we were in some sort of tunnel. The crude steps gave place to a rambling downward incline, and the air blew cool about us with a smell of ozone. Our guards were silent, but the touches by which they guided us along this winding subterranean path were kind enough. Once, on a piece of rocky going, I stumbled, and the fingers on my arm tightened to a grip that saved me from falling. But no word was spoken.

There was a steady descent of about half a kilometre which brought us into a wider passage, it seemed, and the sound of falling water came to our ears. There was the hum, too, of machinery, and a distant clang of hammers. We began to go down some steep steps, some scores of them, and it felt as if we were descending into a great hall or cavern of vast proportions. There was the sound of voices. Somewhere a man was singing a sort of coon song with a most haunting lilt, but as we with our captors came down the steps, the voices fell silent, and we did not need our eyes to tell us that men were looking at us with curiosity all about. The rushing sound of falling water was louder now, and the hum of machinery in good bearings more insistent.

We reached level ground, and threaded our way among machines—we could smell the lubricant—then our feet rattled hollow on a wooden bridge. Solid ground again, and another flight of wooden steps, a rocky path, and then we were halted with a touch, and the bandages were whipped from our eyes.

Dan and I were blinking at each other in a biggish cave whose rock walls were cream colour. Well-scrubbed tables stood in regular pattern on the roughly levelled floor, with crudely-made benches about them. In one corner of the chamber, shelves of lumber held a number of books, cheap editions of novels mostly, and on the walls were targets for dart games, and boards for wall-quoits. Here and there on the cave walls were pasted coloured and

WITH this installment the great adventure finally comes to a close and it will be with regret that you finish the story. And lest you think that the author has delved too much into the fantastic, let us repeat that there is nothing contained in this epoch-making story that will not come about very much sooner than most of us expect.

Rather, to our minds, the author has been too conservative in picturing scientific achievements of the future. Many of the methods which he so vividly describes are already laboratory possibilities. These things came about soon after the story was written.

We strongly suspect "the Chief's" terrible weapons will be available for the next great war, and we hope and pray that they will be used, not as a destructive means, but rather as a coercive means to keep nations from making war, simply because war will then become too horrible for contemplation.

half-tone illustrations from American and English magazines, reprints of drawings by Kirchner and Fontain that made one think of dugouts on the Western Front years ago. A big hewn opening in one of the cave walls gave light and ventilation and through it was a view of what I took to be the cup-shaped basin to the north of the plateau. I would have crossed to the opening to look out on the scene, but one of our guards pointed his rifle.

"No, don't do that, Mr. Boon," he said, and he added whimsically, after a pause: "Sit down and make yourself miserable for a bit."

He was an American, a lean and lanky individual with a twinkle in his eyes. The other, for now there were only two, was a stout man with that irradicable air of the sea about him which always tells the British seaman.

"Give me your word that you'll make no fuss," the American went on, "and I'll slack this guard on you a morsel. It would do you no good, anyhow, to try and escape. You're corralled."

I was desperately anxious about Milliken and the *Merlin*, but it was plain that to attempt dropping from that high opening, or to rush the door, would be the height of folly, so after a look at Dan I nodded.

"That's fine," said the guard, "and now you can have a drink. It is only synthetic lemonade, but you'll find it good and cold. What say?"

"Sounds like home to me," I replied. "What about you, Dan?"

"I'm with you," said Dan.

The stout seaman waddled out, and by and by returned with two long glasses full of an iced bubbling liquid. After our adventures on the plateau top, it was delicious.

"You look after yourselves here, then?" I suggested to the guard.

"Sure. We don't have to deny ourselves much."

"Ice, too?"

"As you see."

Questions seemingly were barred. In silence, then, Dan and I seated ourselves in two camp chairs, and fell to our drinks. As may be judged, we were both a bit dazed, and feeling dead foolish at having walked so neatly into the trap that was closed on us so firmly. I had a faint hope that Milliken had seen our capture from the bluff, and that he had had the sense to get off with the *Merlin* immediately. If he had, it was only a question of time until armed hordes were swooping down on the pirates' lair. But as I considered the idea, I began to see that it was next to impossible. At the time of the hold-up, Dan and I had been deep enough in the trees round the sinter cones to be screened effectually from view from the bluff.

With that hope in the discard, I began to formulate another, which was that my mechanic would have the time to get off a broadcast message of our whereabouts if the plateau party tried to hold him up. But even as I was turning over in my mind that and other schemes for Milliken, my calculations were pulled up by a distant noise.

Two rifle shots in the distance, a pause—and then the unmistakable "rat-tat-tat! rat-tat-tat!" of a machine-gun.

Milliken was fighting for it!

My heart leaped at the sound, and I felt myself quiver with excitement. We jumped to our feet, Danny and I, and my friend's eyes were ablaze.

"Oh, you, Milliken!" yelled Danny. "Attaboy!"

We both knew the mechanic's deadly skill with the machine-gun, and the likelihood that his attackers would be wiped out if they were anywhere in his reach. We shook hands on it.

"I sympathize with your feelings, Mr. Boon—Mr. Lamont," the cool drawl of our guard came to bring us back to reality. "But don't you let them feelings take you an inch nearer the window, for instance."

Milliken's Fight

HIS rifle was in the crook of his arm, and he was smiling at us grimly. It was galling to have to stand there and listen to the noise of our comrade's lone fight. Now Milliken had brought one of the half-kilo guns into play. The steady "crack-crack!" of it was shattering the air about the plateau. From the attackers no sound came, except twice—two deliberately separate shots from a rifle. There was a last drum of fire, despairing in sound somehow, from one of Milliken's lighter guns, and then—dead quiet.

The silence held through an hour and a half of suspense. Had Milliken managed to get away? I saw difficulty in this, even supposing he had so effectually disposed of his attackers as to let him get out of the *Merlin's* cabin. Before he could make off, he would have to turn her nose away from land, and then there would be the difficulty of starting without some one to flip over the propeller. There was just a chance that he had managed this, though the operation was difficult and dangerous, but I cursed myself that I had not thought of arranging a self-starter for the plane.

Dan and I discussed the probabilities in low tones. We knew the determination and resource of our comrade by a hundred experiences. We pinned our hope to those stout qualities of Milliken, and began to think that we had a chance of rescue. But when ninety minutes had passed, we found our hope was vain.

The curtain over the cave entrance was thrown aside, and Seton entered, leading our mechanic blindfolded.

"Here's your man, Boon," said Seton. "He put up a jolly good fight, but the dice were against him. Cheer up, Milliken—no man could have done better."

"I don't want any certificates from you," Milliken said grimly, the bandages off his eyes. "That's just about the last thing I'll stand for."

"Come, come, Milliken," said Seton gently. "You can't bear all that ill-will."

"You sink the *Merlin* and capture me—well, I can face that!" said Milliken thickly. "But you dope women—a girl like Miss Torrance—who's given you her hand to shake and looked into your eyes! Ill-will! Hell!"

"I see," Seton said quietly. "Well—perhaps you're right, Milliken!"

He turned on his heel and left us with the guards.

Milliken faced Dan and myself then.

"I did my best," he said miserably.

"I'm certain of that, old Milliken," said I.

"If you'd only fired a shot or something—to give me warning——"

I thought with shame that I might have risked a wound to draw the fire of our ambushers, and I felt pretty sick, I can tell you. But I only nodded to him to go on.

"I was cleaning up, before turning her to be ready for making off," Milliken said, "when I heard somebody call, 'Oh, you, Milliken!' It sounded like you, Mr. Boon, but I thought it was mighty queer that you should call at all. Opening the front screen, I answered the hail. 'Oh, you, Milliken,' the voice sings out again,

'come here a minute!'

"Thinks I to myself, that's mighty queer—and then I catch sight of somebody dodging among the trees—and he was wearing clothes of a different shade to yours or Mr. Lamont's. I get wise to the fake, and not knowing what would come of the fight that was due—the *Merlin's* nose being hard up against the trees—I start lowering the aerial of the radio to send off a quick message. There wasn't much chance of it being picked up, what with us being on the water, and with the trees and stuff around, but I thought it was the first move in the game——"

"Good for you, Milliken," said Dan.

"But I'd no sooner lowered the wire than from the bushes near two shots rang out—mighty good shooting, too, for the aerial snapped and the loose end came coiling up into the cabin. That finished the first trick. I made a jump for one of the machine-guns. It wasn't much use. From the position of the boat, I couldn't get the arc of fire I wanted. So I tried the forra'd gun. That wasn't any use. I couldn't get the depression. But I loosed off at a big tree trunk, hoping the shell fragments coming back might do a bit of damage. I brought the tree down.

"All this time the others hadn't answered. But another two shots go bang, and from the noise I judge they've punctured the floats. That is right. The old lady begins to settle, swinging sideways, then I have a go with the other mitrailleuse. But she's settling by the head, and by and by her propeller is buried in the mud. I thought of having some gun play with my automatic, but they'd got me corralled for sure, with no chance of relief coming, so when the blasted pirates wiggled a white flag and I saw who it was I was up against, I chucked in my hand——"

"It was the only thing to do, Milliken," I said. "They'd have starved you out, or riddled the boat. Don't you think so, Dan?"

"Sure," said Dan. "We'll work better three together, anyhow—now we're here."

At this moment Seton came into the cave again, with two or three men—not the least bit piratical, any of them.

"Sorry to disturb you," he said, "and that I must blindfold you once more. You are wanted elsewhere."

There was nothing for it but to submit, and presently we were led along a short passage into another cave.

The bandages were taken from us, and we found ourselves looking into the strangest pair of mild blue eyes ever seen.

The Chief Asks A Promise

THE Chief of the League of the Covenant, who stood facing us, was the merest wisp of a man, physically. Seton would have made four of him, and myself probably three. He was smaller than Dan Lamont. But if the man's physique was insignificant, there was nothing small about his personality. A pale-faced, one-armed little fellow, with a biggish head ornamented with thin brown hair and a silky beard, some keen force jumped out of him that was like a bright blade. The eyes that at first you took to be so extraordinarily mild had depths in them that were blue flame. The eyes held you, mastered you, and in the still placidity of that gentle face you read of a soul that was above pain, sorrow, joy—everything that influences the thought and actions of the ordinary human. It held a sense of bravery, too, relentless courage that made you shiver to think of, for behind it lay a will and a power that nothing human could thwart. Here was a man one could not bluff, for the mind that looked out of him was analytical of your faintest motive, your most vagrant thought or impulse.

I'm afraid that I put down very badly my own impressions at first meeting the Chief of the League. Many a time since I have asked Dan Lamont to turn his uncommon power of analysis on the subject, but even he fails in describing the sensation he felt when he first looked into those extraordinary eyes. The nearest we can both get to it is simply contained in one word—power—power to the *n*th degree.

He took us all in, one by one, then he bent his gaze on me.

"Mr. Boon, I take it?"

I bowed.

"You have pursued us long, Mr. Boon," he said, "and tenaciously. It was inevitable that we should meet. I am afraid that, now you have found us, we must detain you."

Milliken was the next in order.

"I hear, Mr. Milliken, that you are a doughty fighter and that you gave your captors some trouble. If your guns had had position, you probably would have created some carnage. We shall know each other better by and by. Meantime, we must keep you also. Remains then Mr. Lamont——"

He turned to Danny, and one would have said his still look changed slightly as he gazed at my friend. As for Danny, his eyes were alight with a queer excitement—for round the room, or cave, were disposed instrument upon instrument, of all queer shapes—the very stuff that Dan keeps his nose amongst normally in his laboratory in New York.

"Mr. Lamont," said the Chief of the League. "I do not know what feelings you have about this capture, but I hope I may be able to dissipate your resentment by showing you some interesting sidelights on your own vein of research. I have read your interesting little book on pleochroic halos, together with other of your works. I have long had a bone to pick with you on the subject of thorium disintegration. Forgive me, then, if I welcome the happy accident that brings you here."

"You're very good, sir," said Dan, red-faced as always by any reference to his work.

"Why, that's well," said the little man. "I do not despair of making friends with you—with you all. Now, gentlemen, it is obvious that I cannot release you until the task of our League is finished. We cannot afford to have our secret laid bare. I do not wish to keep you in close captivity, and you will therefore give me your word that you will not attempt to escape?"

Danny and Milliken both looked at me in enquiry. It was obvious that the man in front of us had charmed them as much as he charmed me, but the question of giving parole was one that could not be decided at a flash. The Chief picked up the thought.

"Naturally, you will need time to consider the question. To sit down quietly in the present situation might savour of cowardice. Let me put it to you, however. If I do not have your word, gentlemen, you will be closely confined, except for brief periods when you may exercise. Your machine will be dismantled where she lies and brought to some other place, so that that means of escape will be cut off. The country round about us is nearly impassable without bearers and stores. I may tell you that—I who have tried it, and I have an accurate knowledge of the dangers and diffi-

culties that beset the traveller through the dense Amazon jungle. If you are ignorant of them, these dangers will not daunt you. They daunt me. But take your time to consider the matter, by all means. Let me hear from you when you decide."

He turned back to his work at one of the instruments, and the guards blindfolded us once more.

This time we had a cave to ourselves, a little cave, well enough lighted and ventilated by a winding crack in the outer wall, through which, however, it would have been impossible to make any exit. Three beds were disposed about the cave, and a rough stool or two. We found all our clothes and stuff, brought down from the *Merlin*, but they had not left us even a pocket-knife by way of a weapon, or even a watch by way of compass.

Food was brought to us by the stout seaman who had been guarding us in the bigger cave—fragrant tea in enamelled mugs, with excellent white bread and jam the first time, and later a savoury stew of venison of some sort with vegetables. The stout seaman was most unloquacious. He waddled in and out without a word, hardly ever looking at us, but staring glassily in front of him or beyond us. He was, we found out later, one Smithers, formerly a warrant officer in the British navy. Only once did this strange attendant speak to us. Apropos of nothing, he suddenly fixed the trio of us with a comprehensive and basilisk glare. A hoarse rumble mounted apparently from his feet to his short throat.

"Does any o' you gen'lemen know anythin' about toucans?" he rumbled.

The inappropriateness of the question beat us into surprised silence. We simply gazed at him open-mouthed. Again the hoarse rumble welled up from the region of his feet.

"I thought not" he said complacently. "Well—you soon will!"

And with a portentous nod to the company in general, this strange fellow heaved himself from the cave.

We were well treated. Games of sorts were offered to us, and we had the use of powerful electric lights when night came, but we were strictly left to ourselves. No guard was left in our cave, but a peep round the curtain over the entrance showed a fellow with a rifle sitting a little along a well lit passage. It was a trifle disconcerting to peep out and find ourselves winked at serenely by a perfectly wide-awake and obviously competent sentinel.

The three of us thrashed out every possible scheme of escape, but everything we tried in imagination brought us up with a round turn. Milliken and I reconstructed a map on the floor of the cave, and came to the conclusion that we were somewhere on the borders of Colombia, Venezuela and Brazil, hundreds of kilometres away from any reasonable civilization. Without food or any weapons for providing it, with no sense of our direction once we left the plateau and began to traverse the sunless forest or follow equally sunless rivers, escape seemed impossible. South of us lay league upon league of dense forest and swamp, north and west high barriers of mountains, and to the east a ramified veinwork of rivers, apparently tributary to the Amazon. I did not feel competent to lead my companions through any of these ways, granting that we escaped from the plateau. My paths are in the air. I have no skill in woodcraft and jungle work. I felt lost.

This sense of being lost was shared not only by Dan Lamont, but by even the resourceful Milliken. Had I been competent to lead, he would have followed, but taking the lead himself he felt to be out of the question. It must be remembered that in our approach to the plateau, the *Merlin* had covered hundreds and hundreds of kilometres in wide circles without bringing into our view the slightest trace of human occupation. We had to discard the idea of escaping by land entirely.

We had a vague notion of one of us stowing away in the airship and escaping from her on some raid, but consideration of the plan soon showed us that it was impossible. There remained the breaking of our parole. We did not discuss that. At length we decided to give our word not to attempt escape.

To this moment, when I look back and wonder a little that we did not make a bid for freedom, I hold the belief that the dominating and persuasive personality of the Chief of the League had much to do with our acceptance of the situation. For myself, I became avid to see the ship and the weapons which had fooled me so completely on my *Merlin*, and Dan Lamont was in a fever to be nosing out the scientific facts that gave the raiders such power. In the laboratory of the Chief he had seen much in the way of instruments and plant that was unfamiliar even to his skilled eye, and he considered that his object in joining my party was gained in having reached the workshop of the man who had planned the raids. Milliken saw no means of escape. He was downcast about it, but he accepted the situation, and shared the desire to look closely at the airship—though in a slighter degree than myself, since he had a rooted contempt for so-called lighter-than-air machines

When morning came we all three desired an interview with the Chief, which was immediately granted.

"You have acted wisely, gentlemen," he said. "Escape was impossible. Even if you had eluded pursuit, the chances were all against you ever reaching civilization. Let me explain to you, partly——"

He went over to a cupboard, and brought out a linen bag containing something roughly round in shape, little bigger than an orange.

"Of all the men who have joined the League of the Covenant," he said quietly—"and there are close on fifty men here, some of whom have been in these caves for three years—only one fell short of absolute loyal and devoted service. One man—a traitor. We do not say his name, nor do we mention his nationality. He is forgotten as if he never existed. This man forgot his allegiance. The world pulled at him, his desire for the fleshpots—he deserted the company and tried to make his way back to civilization."

With his solitary hand the Chief was undoing the strings of the linen bag with a singular deftness.

"On his journey out—it was two days before we started in pursuit, for he had been hunting—he fell in with a tribe of Indians, the Mandaruen, who have one curious art. The story we heard afterwards was that this traitor insulted one of the native women—he was that sort of man—and he was taken and killed. Months later, two of our hunters came upon the same tribe. In one of the huts they found this."

He let the sides of the bag fall away, and he pulled out a miniature head. This was longish haired, highly varnished, and the lips had been sewn together with brightly coloured threads which hung down in long strands far below the severed neck.

"Good Lord, sir!" I exclaimed. "It isn't the traitor's head?"

"That, Mr. Boon," said the Chief, "is just what this

object is. It is the head of our traitor, shrunk to this little measure by the art of the Indians."

"I have heard of the process, sir," Dan Lamont put in. "They take out the bone structure, and shrink the flesh with hot pebbles——?"

"That is the process, I believe. The lips are sewn together to prevent the victim cursing his captor. The preservation of the lineaments is quite remarkable."

The Chief gently replaced the head in its cover and turned to us.

"I do not insult you by suggesting that, having given your word, you would endeavor to escape, and that is not why I have shown you this curious relic of one who attempted it. You will be free to explore round the plateau as you like, and to examine all our caves. But I warn you not to stray too far. It is dangerous to be bushed in the Amazon forests, and to fall victim to the curious pickling art of the Mandaruen is perhaps the least painful of the fates that might overtake you. I warn you solemnly to take care how you go."

"Thank you, sir," I said.

"One other thing I must request of you," he went on. "You are granted the freedom to go outside the caves on the obvious condition that in the event of aircraft flying over the plateau as your *Merlin* did, you will not make any signal or reveal your presence in any way. If you sight aircraft while in the open and out of fair reach of cover, you will stand quite still at once and not look up. As an airman, Mr. Boon, you will appreciate my reasons for that request?"

"Yes, sir. Quite."

"I put it briefly. In the event of anything happening hostile to the purpose of the League of the Covenant, you will act as if you were members of the League, short of joining in any retaliatory measures we may take against our enemies. Do I make myself clear?"

"Yes, sir," we said.

"And I have your promises?"

We all assented.

"That is well. You are free to move about as you please. If you wish to go hunting, guns will be provided you. I advise you, however, to join with either Lord Devonridge or Mr. Haynes to begin with. Or perhaps Mr. Greensleeve or Mr. Whittaker might guide you. These are our most skilled *shikaris*. You must not allow yourselves to be without anything necessary for your comfort. We are your hosts."

We were amazed at such reliance on our simple word, and we could see how it was that the little leader had gained the unswerving loyalty of his band. We thanked him.

"Not at all," was the reply. "We want you all to have a real idea of us, to see that we are honest men banded for a great purpose. To subject accidental prisoners to close captivity is no part of our scheme. And now, my good Boon, you are no doubt anxious about your beautiful seaplane. Commander Seton will supply you and Milliken with all the tackle and the men necessary for raising her. When she is reconditioned, bring her down to the north basin and into the cavern. We shall find a place for berthing her in safety."

He turned to Dan.

"Mr. Lamont," he said, "I have much to show you, but you may go with your friends if you desire——"

"I'll stay with you, sir," said Dan, his face aflame, glancing uneasily at us.

I can't say that I blamed Dan much, for this strange man must have unusual things.

A Terrible Temptation

I MUST not say much about the interior of the great system of caves under the plateau. Seton has given a full description. But the amazement of Milliken and myself, and later of Dan Lamont, on seeing the marvellous equipment of the League, the splendidly organized machine-shops and power stations, may easily be guessed. It seemed incredible that a mere handful of men had so secretly collected that mass of material and had created such an efficient depot for the erection and docking of the marvellous airships—there were two of them—in such a short time.

The immensity of the caverns was awe-inspiring. With the glow of a furnace here, the hum of the dynamos there, the rush of water to the big hydraulic mains of the turbines and the splash of the excess to the basin of the cavern, the glare of the arcs, the shimmer of the great airships, an effect was created that gave one the impression of being in a dream. Truly, it was difficult to persuade oneself that one was awake.

As Seton conducted Milliken and myself about the caves, showing us everything that was to be seen, we met many members of the League. There was not a man among them who could not look you squarely in the eye, or who had not every appearance of sterling honesty. In Milliken and myself, as the pilots of the *Merlin*—the only air machine to get within real fighting distance of the *Ark of the Covenant*—the men in the caves showed a keen interest. We had to fight the battle off Mogador over and over again with new groups as they collected round us in the various departments. Even Milliken began to lose his resentment. To harbour ill-feeling among so many specimens of decent citizens was impossible. Here were clean-limbed, keen-faced young Americans and Englishmen, and older men, graver of mien than the younger fellows, but all clearly good types of intelligent humanity. A crew less piratical could not have been imagined.

That every man among them was imbued with a sense of high purpose was not obviously apparent, but that it was there could not be denied. The eager questions that were shot at us about the effects of the raids were a clear indication of the keen interest that was taken in the object of the League.

I will say that Seton had a splendid way with the men under his command. He knew just the right thing to say, and the right way to say it, to get the best out of each man. His authority was unmistakable, though his exercise of it was anything but vigorous.

The gang he picked to help in the refloating of the *Merlin* could not have been bettered. They seemed to be sailors mostly, and among them was that stout and silent mariner of the question about toucans, specially called out of the commissariat for the job. The gang collected material for the purpose, and with Milliken, myself and Seton, set out for the top of the plateau.

We climbed by a high staircase to a tunnel entrance, and began to ascend that passage by which Dan and myself had been brought blindfold into the cavern. This passage was a natural one, the track, we were told, of an ancient underground stream. It was lit up at intervals along its length by electric globes, and emergence to the top of the plateau was gained by an opening which was concealed among dense undergrowth. Near here stood the sinter cones that Dan and I had been examining when we were captured.

The raising of the *Merlin* was done in very seamanlike fashion. A tree was felled close to the plane, and was lopped and trimmed into the arm of a rough der-

rick, and this was hoisted by means of cables reeved to standing timber, firmly stayed, till its upper end hung over the *Merlin*. From this point was depended a tackle of two double blocks, the lower of which was hooked to the ring-bolt on the *Merlin's* cabin-top. When all was set, the gang "ran away" with the cable, navy fashion, and the hull of the seaplane came out of the water. Pumping out the water from the floats and patching the bullet-holes took very little time, and at last the *Merlin* floated on the lake, very much herself again, except for a muddy nose and a scratch or two.

Her engine, in spite of the ducking, was in such a condition that only half an hour's work was needed to put it in order, and when Seton had given instructions to the gang to remove all traces of our operations before returning, he joined Milliken and myself aboard the plane. Presently we had taken off from the lake and were circling above the plateau.

I don't think I need tell of the feelings that held me when I found myself in the air with the old bus again, or of the temptations that possessed Milliken and myself. I think Seton gauged the turmoil in our hearts with fair accuracy, for he smiled whimsically at my mechanic and myself with a nice air of sympathy.

"Let her out for a bit, Boon," he said. "I'd like to see how she goes. No hurry to return yet."

I took him at his word and swung the plane into a northerly course, stunting to show her paces. In the interest shown by Seton in the bus, we went further north than we intended, and I was just about to let him take the controls to try her when, dead ahead of us, the speck of another plane came into sight!

Seton saw the approach of the other machine as soon as I did.

"Keep to your course, Boon," he said quietly. "And answer her signals."

"You forget that our radio aerial's shot away," I replied.

"Haven't you a spare?"

"Rig the spare aerial, Milliken," I told the mechanic, whose hands were working convulsively and whose face was white.

Milliken silently snipped the cords binding the coil of wire and quickly attached the spare weight, which he lowered through the aperture. He then connected the slack to the drum.

"I'll do the lying that's necessary," said Seton, and went to the keyboard of the radio.

On came the machine, heading for us, and we heard a voice in the open phone.

"Hullo, *Merlin!* Anything doing this way?"

"Use the key," Seton tapped. "Phone attachment disc."

"Anything doing this way?" the question came in Morse.

"Not a thing," Seton buzzed back. "We've been wasting time here."

"Where are you heading for?"

"Don't know—Caracas way, likely. Been on a false scent. Try eastwards."

"Thanks, *Merlin*. Good hunting!"

And with that the stranger swung east, while we kept to our course.

All this time Milliken had been standing behind Seton, with plenty of loose tackle about that would have made a weapon for attack. One blow with a spanner, for example, on the back of the big man's defenceless head would have given him his quietus and us our freedom. When at last Seton turned, my mechanic was staring out of a porthole on the opposite side, pale of face and his lips working.

"Thank you, Milliken," Seton said quietly. "But I beg your pardon. I had no right to expose you to that temptation."

"Mr. Lamont was left in the cave," the mechanic said hoarsely, still looking out of the porthole.

"I don't think it was *that*, Milliken," Seton said, and he thrust his hand past the mechanic, so that he could not help seeing it. Milliken turned with a fierce gesture.

"Hell!" he almost snarled. Then with something of a gulp:

"You gave me the back of your head, Seton—and me with a spanner handy——!"

He snatched at the extended hand. Seton wrung the other hard, and turned to me.

"May I have that chance to handle her, Boon?" he asked, "when we turn south again?"

CHAPTER II

A Lecture From Lamont

FOR some time after our capture Milliken and I were very much left to ourselves as far as Dan Lamont was concerned. Our friend haunted the laboratory of the Chief of the League and it was evident that all his scientific interest had been aroused by the things he saw there.

He grew more and more silent and the boyishness left him. He was preoccupied and grave, with only rare flashes of his careless humour, but in his gravity he was perhaps more lovable than ever. The Dan Lamont who stood in the front rank of the scientists on both sides of the Atlantic was on top.

The Chief gradually fell to treating Dan as a big fellow scientist, there was no doubt of that. We would often see the pair of them strolling about the caves, absorbed in deep discussion, and while for the most part Dan's share seemed to be in listening, we could see that his opinion counted with the amazing leader of the League. If Milliken and I encountered our friend while he was in the company of the Chief, the greeting we got was an absent-minded smile and nod, nothing more.

My mechanic and I were content enough with the arrangement, for Milliken shared the lively respect I had for Dan's ability, and we argued that Dan was after stuff that neither of us could begin to grasp. So we waited with patience until Dan was ready to speak to us of his discoveries, or of the revelations made to him by the little leader.

That we should have something to hear was plain from what we had seen in the airships themselves. Seton in showing us over the vessels kept nothing back. We only saw, however, the instruments and apparatus used for controlling the mysterious powers of the League. Seton did not pretend to any deep knowledge of the means by which these instruments were worked.

The airship was a constant marvel to Milliken and myself, and it was clearly shown what little chance our *Merlin* would have had against her in our encounter if her full powers had been exerted. Apart from any weapon of offence, her mere power of climbing—by reason of that extremely light gas used to buoy her and the marvellously adjusted apparatus for suddenly expanding it in her ballonets—would have taken her far out of our reach at any moment. This, in combination with the engine-stopping ray, would have made

our best manœuvres on the *Merlin* quite ineffective.

Even if we had succeeded with our contemplated quick dive in smashing the stern engines and controls, the airship would still have had ample power and manœuverability to rise to a great height and proceed home. Even a swarm of *Merlins* would not have been able to master the ship. Seton hinted at other weapons to be used as a last resort, weapons that in a few seconds could have disposed of the biggest air fleet imaginable, leaving no trace of man or metal. Yet, understanding all this, Milliken and I were even then hardly prepared for the revelations Dan made to us one night when we had been in the cavern some weeks.

We had seen nothing of Dan all day, and when he appeared Milliken and I were about to go to bed. Our little companion was white and almost shaking, as if he had just seen a vision, and he looked old.

"What's the matter, Dan?" I cried, and ran to help him.

He sat down on his bed, and looked at me wanly.

"Jimmy," he said, "the world is beaten! It will have to surrender to the League of the Covenant! That little man—my God!—how big he is!"

"There's no doubting that, Danny," I said quietly, "his bigness, I mean."

"It takes a man trained in science to understand fully how great that little fellow is," said Dan, "though even then it is difficult to believe what he says is true. But I have seen proofs, Jimmy—proofs that must convince the veriest sceptic amongst us, among men of science. You know I'm reckoned to be no smouch at my job—I can say that for myself?" he pleaded.

"Sure, Danny," I replied soothingly, he was so painfully modest in making the claim. "All the world knows you're a wizard."

"I'm glad if I count for something," he said—"glad because they may take my word for it that we're beaten. They'll *have* to take my word for it—they'll just *have to!* We can't let the League exert its greatest power. If the peoples don't believe—then it's all up with the earth as we know it. God knows what will happen!"

"Will the Chief push that power?" I asked.

Dan looked at me pityingly.

"Can you doubt that determination—the will that's behind that personality? My dear Jimmy! Don't let the fact that the Chief has been so careful of human life up to now blind you to the real issue. If humanity does not come to heel and behave, humanity will be destroyed. If anything is sure, that is. The Master is a scientist, when all's said and done, and is probably inclined to look upon man at long last as 'merely small crawling masses of impure carbohydrates.' That's all man will be if he refuses what the Master offers. Then there's the will of him! Why, I believe the man we know as the Chief has been dead for years. The torture he has endured for years no human could endure and live! There's nothing there but the Will—and, by God!—what a force it is! Only the will keeps him alive with that mighty big hole in his side—and he won't die until his task is finished. Finished it will be, too, even if it means the destruction of the earth. It might mean the destruction of the solar system—of the universe!"

He broke off in a whisper. For a minute or two he remained silent, while Milliken and I sat gazing at him, in awe of his unwonted vehemence. Then he looked up with a hint of his usual grin.

"Think I'm mad, I suppose, old Jimmy?" he smiled. "I don't blame you if you do—but I'm sane—as sane as any physicist could be after to-night's experience. What do you know about the atomic theory, Jimmy?" he broke off.

"Oh, just layman's knowledge," I answered—"the nucleus and the odd electrons, and the periodic law kind of thing——"

Dan nodded, and turned to Milliken.

"And you, Milliken?"

"About the same, sir," said Milliken. "Enough, anyway," he added surprisingly, "to realize that this light gas the League has is likely to upset the present table of atomic weights."

"Good for you, Milliken," Dan laughed through his gravity—for indeed one never knew what Milliken had stored in that head of his. "But it still has to be shown that the table has been so greatly upset. So far, the Chief has not been able to determine absolutely the constitution of the *aithon* unit, except that it has no valence—that its system is a satisfied one——"

"Is that the same as inert, sir?" asked Milliken.

"That's it. It won't combine with anything"

"And that's why our shells did not fire the gas in the envelope?" Milliken insisted.

"Exactly. The *aithon* would not make the necessary combination with oxygen," Dan said patiently. "Now think of it. We know hydrogen, unsatisfied with its one external electron, has a valence of one. Helium, the element next to hydrogen in weight, satisfied with its two electrons external to the nucleus, has no valence whatever. Here's a thing lighter than either, also with no valence. What makes up its system? We imagine hydrogen to have a positive nucleus round which is whirling a negative electron—or that they're going round each other like the knobs on a twirled dumbbell. That's the simplest system we know. But this *atherium*—I mean this *aithon*—is much lighter in mass than the hydrogen and a simpler system is argued. I'm putting it very crudely and in painfully unscientific terms, but I want you to understand——"

"We get you so far, Dan," said I. "What follows exactly?"

"One mustn't say what follows—exactly," he replied. "The thing must be determined by experiment before one begins to talk in set terms. I leave it so, and get along to the next point.

"But it is a curious thing about scientific discovery," he went on, half to himself, "that each new step, at first thought revolutionary, serves but to illumine older ideas. We can say that much about the discovery of radio-activity. A few years before, the discovery of radium by the Curies in 1897, anyone postulating the now established facts about radium would have been laughed at; but it was only by applying to the new facts of radium the then established principles of science that the full significance of these new facts was realized. This may well prove to be the case with *aithon*, when new instruments are made to examine it more delicately than is now possible."

We were now getting a taste of Dan Lamont, the university lecturer, and I dare say Milliken and I were gaping at him, for he turned suddenly with a grin and said as if mocking his own seriousness:

"This is deep stuff, Jimmy!"

"You bet it is, Danny," I said. "But go on."

"I'm going to," he declared. "I've got to make you see, if I can, what has been going on in this cavern—aye, and for years before in the brain of the Chief. You know what happens when you ionize a gas?"

"You turn it into a conductor of electricity," I suggested.

"Crude, crude," said Dan, " and I wish for the sake of brevity your description would serve. You make it, as a matter of fact, an electrolyte, bringing it into a dissociated condition of oppositely charged positive and negative ions. These little fellows, the ions, hop over to their opposite poles, making what's called an electric current. Well, you can ionize this *aithon*. I've seen it done to-night. I've also seen its quite distinctive spectrum. It ionizes comparatively easily. That would make you think *aithon* had some atomic system as we understand it now."

He broke off again to pace up and down the cave for a moment or two in silence.

"Let us imagine," he went on—"imagine the sun to be the positively charged nucleus of the hydrogen atom, and say—leaving out the remainder of the solar planets for the sake of convenience—that the earth is the single electron. Never mind the failure of the comparison as regards relative mass. Bring the mass of the sun down to the size of the nucleus of the hydrogen atom, and say that we could see its electron, the earth. Do you get me?"

"I get you, Dan," said I.

"Well? Have you nothing to ask me?"

"No," I said slowly. "Not a thing."

Dan looked at me with great pity.

"I embark on entirely unscientific analogies to meet the deficiencies of your education, and you reward me so," said he. "What about you, Milliken?"

"I'd ask you if the moon came into it at all," Milliken said with a grin at me.

"There is balm in Gilead!" said Dan. "That's the notion. On the principle of 'little fleas with lesser fleas' how do we know that the electron, so called, is not like the earth, a minute system in itself?—held, it is true, by the nucleus? It has been proved beyond cavil in the laboratory next door that this new gas has mass—yet its atomic weight is demonstrably lighter than hydrogen—seven times less. Are we not brought to the conclusion, then, that beyond and within the present known system of the atom there is another, infinitely more minute in unit, and that that which we know as the electron is to those units merely what the atom is to its electrons?"

Dan was still walking up and down the cave, but now he was shaking his loose change in his cupped hands, the old trick when excited. He turned to us with his eyes agleam.

"For the last year or two," he went on, "much of my experimenting has been to discover why electrons varied in behaviour. The electrons of different radioactive substances, though nominally of the same mass and character, often failed to behave similarly in like experiments. I wondered why—why? I begin to think that with the discovery of this *aithon* we fringe on the cause. We may be on the point of solving that phenomenon which, for lack of a better name, we have called these many years the *ether*—that mysterious, supposedly intangible medium to which, through its conduction of the sun's energy, we owe our very life!"

A Terrible Power

"THE ether!" cried Danny. "There's a thought to fire the imagination! What if it should arrive that we find the ether to be our standard for measuring matter? What if it should prove that the ether is composed of particles of matter infinitely smaller than the electron as we now understand it? Proof of that would go far to upset our present ideas with regard to radiation, energy, light—eh, Jimmy?—eh, Milliken? Upset them—or else illumine them still further!"

It would be unfair to Dan if I attempted to record his development of the theme as if in his own words. Looking back on what I've already written from memory of what Dan said, it doesn't seem at all up to the standard of his talk. I couldn't better it if I rewrote it, so it must stand. The subject is one on which I have but the slightest knowledge, and much that Dan said that night was completely over my head and Milliken's.

When I ask Dan, a very busy man nowadays, even to read what I have written of our conversation that night in the cave, he laughs and says that what I imagine he said will do well enough. If anyone wants accuracy there are plenty of text-books. So I have to give what garbled and hazy version of theory and discovery I must.

It appears that the discovery of the new gas by the Chief of the League came only as additional evidence of facts he had proved in years of secret experiment. The finding of the *aithon*—except in so far as the secretion and amount of it is concerned—surprised the Master very little. He had proved long before to his own satisfaction a fact that Dan had faint glimmerings of: that the atom with its system of nucleus and attendant electrons was *not* the smallest unit of matter.

Isaac Newton, more than two centuries ago, put forward the hypothesis that light was simply the radiation of minute particles of matter from a glowing body—an idea, according to Dan, which modern scientists still valued as a startling suggestion from the old boy which anticipated later discovery. The scientists valued it, though they discarded it in favour of the wave or transverse vibration of the ether story.

Light and energy as far as I follow the reasoning, were inseparable. The light from the sun may come in waves, but waves cannot occur in a void. Matter of some sort is needed for the transmission of vibrations. The medium lying in space between the earth and the sun would therefore be matter. When the shipwrecked mariner put two watch glasses together with water between them, and focussed the sun's rays on his tinder, setting it alight—what did he concentrate? Light or energy? Newton would have said particles of matter. Maxwell or Hertz may have explained it on the electromagnetic theory. But that, as Doc Peets of Wolfville would say, "is however."

When hydrogen is bombarded by *alpha* particles, as shown by Rutherford in 1919, the heavier helium atom (minus its two electrons) sometimes has a head-on collision with a lighter hydrogen atom. The latter is repelled in the same direction as that travelled by the *alpha* particle, but, having smaller mass and greater velocity than its repellent, travels further through the hydrogen gas than the particle that banged it could. These H-particles might possibly collide with other hydrogen atoms and so keep the ball rolling, as it were.

From similar phenomena in his own observation, the Chief was led to discard in part the later theory of light, and to go back to Newton's idea. He worked on the assumption that the heat of the sun, and its light, was transmitted through the material ether as varying forces of kinetic energy by a progression on the same principle as the H-particles were pellated through the hydrogen. Light came, not so much in waves as in particles at varying speeds, and the spectroscope regis-

tered not so much waves or vibrations but these particles at varying speeds. Beyond the power of the spectroscope's register lay the greatest force of all—or almost the greatest—the ultra-violet rays of the modern scientist.

The tangibility, so to word it, of the ether, and its constant interposition of its atoms in the path of the high velocity particles thrown off by the sun, gradually diminished the force of these particles and probably changed their character, thus saving the earth from the destruction inevitable if this mighty energy had reached it unhindered and unchanged. The ether, roughly speaking, acted on the majority of the particles like the plant that reduces the voltage of electricity for domestic uses. Though in the course of the long journey from the sun, through such a dense atomic blanket, more particles had collision than was the case with the *alpha* particles in hydrogen (since *alpha* particles travel only at from 5,000 to 10,000 miles a second, while the *u-v* particles, with an infinitely greater range and greater voyage, started off with an immeasurably greater speed than the old conception of light speed: 185,000 miles per second) a countless number of the *u-v* particles won through. The cases of the *alpha* particles in hydrogen and the *u-v* particles in the ether were analogous in so far as both were heavier than the atoms on which they impinged, the *u-v* particles, however, being infinitely smaller than *alpha* particles.

As with all the series of rays thrown off by radio-active minerals, which can be deflected in their flight by electric or magnetic fields, so it was discovered that these unseen rays from the sun could be shepherded—and not only shepherded, but *concentrated*. But as in the first experiments with the rays from radium, where the highly important *alpha* particles were neglected for the more showy and more penetrating *beta* and *gamma* rays, beyond the ultra-violet rays in the new science was a varying ray less showy, but infinitely more astonishing in its effects—the Neutral tint ray.

In trying to explain the source of the energy contained in radium, the scientists of the early 'twenties pinned their belief to the more demonstrable and feasible theory that the energy was inherent—thus discarding the apparently merely romantic notion that the source of its energy was cosmical. It was said, since it could not be proved otherwise by any known experiment, that the rate or progress of radiation from these new elements could not be speeded up, and that radio-activity could not be created, though it could be induced for a short period of life in certain compounds and elements brought into proximity with radio-active substances.

In experimenting, however, on radium bromide with the concentrated Neutral-tint rays from the sun, the Chief discovered that the salts became supercharged with energy, and threw off not only the previously known rays of the *alpha*, *beta* and *gamma* type at increased speeds, but other rays of a different nature, still unnamed at the time of writing.

Uranium—supposed by the experimenters of the early 'twenties to be the parent of radium—also was subjected to the new rays, and in a day or two had thrown off an appreciable Uranium X emanation, which crystallized into pure ionium, apparently missing two transition periods. The ionium threw off all the new rays seen in the treated radium bromide, and in a few hours it also deposited a film on its container. That film reacted chemically as pure radium! Thus, into a few poor days of human life, the Chief packed the work which normally occupies nature over eight thousand million years!

The ultimate result of his treatment of the radium was its reduction through the various known stages to polonium and lead. The uranium and other radio-active elements were, in relation to the intense radio-activity of the sun, just what elements capable of induced radio-activity were to radium. The radio-active elements were only substances peculiarly adapted for storing and throwing off the energy of the Neutral-tint and other radiations of the sun.

The decision of the earlier experimenters, neither that the rate of radiation from active substances, nor that radio-activity could be produced artificially, was upset by these discoveries of the Chief and by his later experiments on non-active substances. With a weak concentration of the *N-t* ray on boron, which was of the normal atomic weight 11, he succeeded in producing a boron which was isotopic at 10. In the process, a zinc-sulphide screen, carefully insulated from the *N-t* ray, scintillated to the passage of electrons thrown from the boron. With other elements, non-active normally, he found on subjecting them to the *N-t* rays that he could produce sub-rays very little different from the ordinary rays of radium.

So far, the experiments of the Chief had been made with the selection and concentration of the actual rays from the sun, and he set himself, since the new rays were demonstrably electrical in character, to the production of an artificial ray with the same powers. He succeeded. And in succeeding he discovered that the power of the ray was controllable in a way not possible when he had been reflecting the natural rays through the regularly spaced molecules of crystals. Here he came on an element of danger, for with his cathode of a special and still secret substance, he developed a power far beyond that of the natural rays. He found towards the highest power of his projector that he could energize the atoms of different elements to such an extent that he feared to exert the full power of the rays. But with middle variations of the power he was able to alter the atomic structure of any element, and bring an actual chemical change.

He had, in fact, discovered the secret of transmutation!

Here was a mighty power! He subjected both actinium and thorium to a carefully calculated degree of his ray, making them, when they reached the state D, expel *alpha* instead of *beta* particles—and the result was *gold!* It was an isotope of gold, no doubt, but it was perfectly stable, and to the ordinary reactions a gold that would pass in the markets of the world.

With this power in his hand, the Chief of the League of the Covenant was practically omnipotent. He had fathomed the deepest secret of nature and science. If he could make gold of that which was gradually resolving into lead by the slow processes of nature, he was also able by the touching of a screw to turn gold into lead. So far from upsetting the basic principles of radio-activity as understood by his scientific confrères, his work in the main went to support and confirm all their theories and generalizations—except that none had believed the power to effect the changes was attainable. But the apex of his power was that he could unshackle the energy of the atom—yet even he dreaded the full exertion of this power, lest once begun he could not stop the process. The consequence of unloosing that power might readily mean the destruction of the earth, of even the universe!

Lamont Deserts

LONG into the night Danny talked to us, enfolding mystery on mystery, and the further he went the deeper grew the amazement of Milliken and myself. Our little comrade held us enthralled. He seemed at times to grow in stature, and his voice, normally slight and a trifle stammering, became almost sonorous. He never faltered.

Thread on thread he gathered the various scientific issues that had bewildered us, and he wove them into a close pattern. The power that was in the hand of the Chief was capable of the most astounding variation. The anæsthetizing gas, for example, the real composition of which is still a secret, though it is something akin to nitrogen, if infinitely more stable, was controlled, as we had believed. A ray of the *N-t* series was directed at it, and the atoms of the gas thrown into magnetic sworls, tractating one after the other to a central nodality. Where this nodality moved, the atoms followed in a state of high activity, always struggling to reach the magnetic centre. The explanation of the tarnishing of the gold, as far as I can remember, was something after this fashion: That the *N-t* ray controlling the gas was of such a character that it was inclined to rob the gold atom of something over a hundred positive charges, turning a slight outer skin to an isotope of copper, which was then affectable by the anæsthetic gas.

Another of the *N-t* rays, properly graded, had an effect on the electric current of internal-combustion engines—or indeed on any electrical current—which so changed the character of the current used for firing the gasoline vapour that a spark could not be produced between the points of the plugs. The intermittent recovery of the *Merlin* engines when we were sent down that day off Madeira was due, we were told, to the difficulty of keeping the ray on the engine as we hovered down, but for later use the ray was given a wider scatter, so to speak, and the trouble of aiming was obviated. Danny's cage would have been of little value, as the ray was intended primarily for the electrons passing through the engine's electrical circuit. Even the passing of a high-tension current through the cage would not have arrested the ray. It had enough power to pass beyond the cage.

"There it is, Jimmy," Danny concluded an explanation that had thoroughly absorbed both Milliken and myself till the break of day.

"That's the power that is behind the League of the Covenant. If the Chief chooses, he can upset the currency values right through the world. He can wipe out the stocks of gold and silver, or by reversal of the process he can produce the metals so cheaply that they will become valueless. Think of the chaos he could create! He could melt warships, destroy guns, reduce machinery to powder—the power beyond! Thank God the knowledge came to one of a spirit so benign!"

"Thank God, indeed," I echoed with a queer feeling of reverence. "Any man smaller of mind than he would have used his power for his own enrichment. It's a terrible power!"

"A terrible power," Dan agreed, ablaze with enthusiasm, "but properly used, what a power for good! The fall of Man, Jimmy, came from his use of the knowledge he had, not to think upwards and to ennoble himself, but to gratify the beast in him. That's what the Master dreads. Through all the history of science, each new discovery has been prostituted for the support of material, and even evil, purposes. Take radium. It was immediately pinned on for the creation of an industry—and what did they do with it when they got it. They illuminated gun-sights for the destruction of human beings! In the European War the price of radium went up a hundredfold, and the people who discovered it and might have turned it to helping humanity could not get enough of it for their experiments.

"The Chief will give his knowledge to the world—but he must have a guarantee that it won't be used for war. The power he will give, properly developed, can lead to the manumission of mankind. So far, Jimmy, man has been struggling along on the grudging supply of energy that nature allowed him—and his greatest need has been for energy. The Chief points the way to unlimited, boundless energy—but it must be used for man's ennoblement, and for that only. Before the secret shall be prostituted to mean ends, the Chief will destroy the earth—aye, and world beyond. And he is right!"

Dan stopped his pacing about to throw out a hand with an impressive gesture.

"I'm not given to emotional utterance," he said slowly, "or to religious allusions, either—you know that, Jimmy Boon. But I will say that the airship of the League is justly and aptly named. It is truly the *Ark of the Covenant*—the ark of that new Covenant which will free man from the hard struggle for existence, for because of that it is the very casket of arcana essentially holy."

Here was a different Dan Lamont. Our little comrade, although I never doubted the depths in him—even when I fooled with him in an ordinary childish rough and tumble—thrilled me in a way of which I never could have imagined him capable. Milliken, too, was affected. He sat on his bed, stockstill, and watched Dan open-eyed.

"I don't know how you feel, Jimmy—or you, old Milliken," Danny went on, "but I'm bound to tell you that I'm with the Master and the League of the Covenant heart and soul. He has trusted me. He has laid bare the innermost secrets of his power, such secrets that none else will hear—and I swear here and now that the Chief has not trusted me in vain! I'm with him. And if he were to die to-morrow, before the accomplishment of his task, the realization of his big dream—I'm here to say that it would be my great honour to carry out his idea to the very end—God helping me. So there it is, Jimmy—there is it, Milliken. I'm turning my coat, if you like—deserting. I'm crossing to the other side!"

For a minute or two Milliken and I sat in silence, and we both looked on the ground. Then Dan came over to us, suddenly the dear, lovable boy again—almost a kid.

"Do you blame me, fellows?" he pleaded. "Do you, Jimmy?—you, Milliken?"

Well—for answer I did what I've never done before or since—hugged a man. I got up to my feet and squeezed the little fellow in my arms.

Milliken, less emotional, perhaps, just wrung Danny's hand. But my mechanic was black in the face—so I gauge that if his method of expression was different, his feelings were very similar to my own.

From the day, in the middle of June, of our capture by the League, until that night when Dan Lamont partially revealed the secret power of the organization, and declared his adherence to the cause of the raiders, a month had elapsed. Throughout that period the League had been very active. We saw the

great airships depart and return successfully several times, and we heard that Madrid, Lisbon, Rome, Berne, and some of the manufacturing cities of France and Britain had been raided.

CHAPTER III

The World at Bay

FROM newspapers picked up in several of these towns it became apparent that the whole world was in a turmoil. None of the plans made for the destruction of the airships showed the slightest sign of success. Hordes of aeroplanes had been sent up against the airships, only to be sent down before they could approach within attacking distance. Nor were anti-aircraft guns of any value. The ship had such a power of stealthy approach and swift descent, that she was nestling over the buildings of the cities before the artillery could come into action, and the get-away was made so quickly that she was out of sight by the time the guns opened fire.

In each raid the ledgers and account books of banks and bondhouses were destroyed, together with heaps of securities representing millions of dollars, and the chaos that ensued in business was terrible. Public confidence was completely undermined, and business all over the world was at a standstill. Now there was no abstraction of gold from the banks and treasuries. The only object, apparently, was the destruction of the mechanism of commerce.

Each day the note of the journals we saw grew more and more hysterical, and there was a rising demand that if the raiders could not be discovered and destroyed, they should be asked on what terms they would cease operations. It now was accepted in the more staid sections of the press that the League of the Covenant was not out for gain. Several of the big English newspapers joined to broadcast a radio to the League, asking what its purpose was against the world. The answer came again from mid-Atlantic, the same laconic: "To stop War!"

Right on the heels of this message, several of the American cities on the Great Lakes, and a few on the Atlantic seaboard, were visited by the airships. The American journals then began asking on their own behalf what purpose lay behind the raids, and they were answered in the same cryptic fashion. Immediately the American journals asked a further question: "Will the League of the Covenant enter into a parley?"

The reply to this was that as soon as the governments were ready to parley, the League would make itself heard.

The journals on both sides of the Atlantic instantly began campaigns for urging their governments to meet the League. The answer of both British and American authorities was to redouble the efforts for the destruction of the League. Of planes and airships scouring the face of the earth for the hiding place of the League the number was legion, and in fact air machines were passing over or within sight of the plateau almost every day.

The disappearance of the *Merlin* and of my party was a matter for comment and speculation not only in America, but in England, for we were supposed to be the first victims of the raiders. The pilot of the airplane which had passed us that day after our capture had reported sighting us, and that we were heading in good shape for Caracas. The conclusion was ultimately arrived at that we had either met with an accident, or had been sent down by the raiders and sunk in the sea. We were given up for lost, and Dan and I had the doubtful pleasure of reading our own obituary notices. The anxiety of my father and his sorrow for my supposed demise gave me a great deal of concern, a feeling shared by Dan and Milliken on account of their relations and friends. But we were forbidden to attempt any communication with the outside world, nor would the Chief permit the sending of any message that might have allayed the doubts of our friends, since it would perhaps have been obvious that we had been captured somewhere on our journey from Guayaquil, a revelation that might have brought greater numbers of searchers on our trail. We knew, from the American papers, that both Didcot and Dick Schuyler, on new *Merlins*, were searching the Caribbean and the Antilles for some trace of us.'

Our days in the cavern were full of interest. At first, Milliken and myself had been content to go about looking round us, but as week after week passed, we found our hands could no longer keep still, and we began to help the company in small ways that did not offend our consciences. With Lord Devonridge and Haynes, and with one Moggs, an ex-gamekeeper of the former, we went out hunting, and we found the three Englishmen excellent companions. Our hunting expeditions had to be worked in between raids, for both Devonridge and Haynes had special duties on the ships.

The raids were always made in pairs. The first ship would go out with twenty-five men or so aboard, and on its return the second ship would depart immediately with a fresh crew, except for the Chief, Seton, and a few of the officers, who semed capable of sustaining the most prolonged strains. At the end of the second voyage a period of rest would ensue, and then the process would be started all over again.

Dan Lamont was now installed definitely as scientific helper to the Chief, and, save that he did not accompany the leader on the raids, he worked untiringly. His adherence to the cause of the League did not bring any estrangement between him and Milliken and myself. Our views with regard to the members of the League had taken on a complete change of colour, for the sincerity actuating these men was unmistakable, and I truly think that both Milliken and I secretly envied our comrade his courage in openly taking the course his conscience dictated.

However that may be, Milliken and I could not find it in our hearts to take the same step, and I dare say the thought of Kirsteen Torrance was in the mind of Milliken as much as in my own. If we could have declared our purpose to her, and could have put the ideal that underlay the operations of the League before her, the step might have been possible. For myself, as an additional factor, I still had the President's commission in my pocket, and until I could hand it back to him in honesty, I could not depart from its terms. But I am certain that the opinion of Kirsteen counted most with me.

Yet, with this enforced aloofness to the purpose of the League, it was not possible for either Milliken or myself to regard its operations without something of a thrill. That the struggle between those selfless men and the world at large was nearing its climax could not be doubted. Each new demonstration of the power of the League was more amazing than its precursor. Towns were attacked—if that word may be used regarding raids so careful of human life—with more open methods each time. No longer was the approach made in the dead of night. The airship would come down

on a city in broad day, and the business of creating chaos in commerce would be gone about as coolly as in the night. The best efforts of the authorities against the raiders were completely useless. Each day it became more certain that the world was at the mercy of the League of the Covenant. The marvel was that the several governments remained so stubborn.

Of the feats performed by the *Ark of the Covenant*, its flight across the Pacific to Japan—where Tokio and Yokohama were subjected to similar treatment to that suffered by New York in the first raid of all—was in some ways the most amazing. The Japanese, who were perhaps the most deserving of a lesson from the League by reason of their everlasting itch for power through the agency of war, had obviously regarded the problem affecting the Western Hemisphere with a degree of complacency. The raid on the capital and chief seaport of the Eastern empire went far to destroy this Japanese smugness and sense of security. Here, by the very unexpectedness of the raid as a result of that complacency, the panic caused was greater than anywhere else, and the Pacific radio stations simply hummed in the next days with the frantic messages that emanated from Japan to the other powers.

This was the most daring of the raids. On a Sunday night in August, the *Ark of the Covenant* set out on its long flight over the Pacific. Sixty hours' leisurely cruising—leisurely for the *Ark*—brought the ship over Tokio just after midnight. Two hours were occupied in a very thorough demonstration, in which the gold chests of the Japanese war fund were sadly depleted, and after a casual replenishing of the airship's gasoline tanks from a handy oil-ship, Yokohama was descended upon in the first grey of dawn. Here the second chapter of a smart lesson was read Nippon, and the *Ark of the Covenant* immediately set out on the return voyage. In spite of the throwing out of cordons of air scouts along the Pacific coast of America, on request of those frantic cables from Japan, the airship was berthing in her hangar-cave at dusk on the Friday night.

An Ultimatum

THE raid on Japan brought matters to a head. The Powers of the Western Hemisphere had been working together for a long time, pooling their ideas, as far as international jealousies would permit, for the scotching of the raiders. Now Japan made a tardy entrance into the fray, and for the first time since the beginning of the raids all the Powers were in something of an agreement for a single purpose. But to enter into a parley with the League formed no part of their mutual understanding.

It seemed as if the several governments considered it beneath their dignity to discuss terms with mere pirates. All they decided was to adopt further measures for forcibly removing the menace to their happy pursuit of trade-snatching, scabbard-rattling, truculent schemes; but that they were at a loss for further methods to accomplish this aim the reports by radio left no room for doubt.

This was the moment chosen by the Chief of the League for issuing his ultimatum to the world in general. The ultimatum was addressed through the President of the United States.

> From the League of the Covenant to Bring Peace on Earth [it ran] to the President of the United States of America.
>
> Sir:
>
> The object of the League of the Covenant has been put before you heretofore in brief. It is now set out in full for the first and last time.
>
> The League of the Covenant is composed of men who have suffered in the past from the horror of war, and that in the patriotic service of their various countries. They are determined that never again, if they can prevent it, will war be seen on the face of the earth. To this end, for the last five months the League has been demonstrating by humane methods the power it has for enforcing its will on the nations.
>
> The efforts of all the governments against the operations of the League have been of no avail. The League exists unharmed.
>
> But time has passed, and the several nations who have felt the power of the League have made no attempt to enter into negotiation with its members.
>
> The time is approaching, therefore, when the League of the Covenant must lay aside its former humane methods, and exert the terrible powers it truly possesses. It is in the power of the League utterly to destroy Mankind, to bring about the end of this cosmic day, and bring a new dawn in the history of the Universe. This will the League of the Covenant do rather than fail in its object. Let there be no mistake. The League of the Covenant has deliberately brought chaos into the world's commerce, so that its power should be understood. Should its fiat not be obeyed, it will put humanity beyond even the need of commerce.
>
> And here is the fiat of the League of the Covenant:
>
> The armies of all countries throughout the world shall be disbanded, all weapons of war shall be destroyed, all ships and air-vessels of war shall be scrapped, and the materials converted to peaceful uses. Only sufficient men and material of war shall be left for that police work made necessary by the uncivilized state of mankind.
>
> For the carrying out of this fiat, representatives of the nations of the world shall be gathered in Washington under your chairmanship, sir, with full power to arrive at an international understanding which will make effective a League of the Nations for Peace; and at the conference thus convened there shall be decided once and for all time the forces that are to be left at the disposal of each nation, taking into consideration the population, and the territorial extent and world disposition of the possession of each nation.
>
> A month from the date of this ultimatum, the representatives of the nations shall be gathered in Washington to meet the representatives of the League of the Covenant, when a complete scheme of disarmament will be put before the conference for acceptance.
>
> Your acceptance, Mr. President, of this order for conference shall be broadcast by radio telegraphy for seven nights after your reception of this document.
>
> No less than the complete fulfilment of these demands will the League of the Covenant accept.
>
> There remains that which the League of the Covenant will do for the real brotherhood of man.
>
> In return for the complete disarmament of the nations the League of the Covenant will place in the hands of an International Board the secret of a power that will bring a new day in the history of mankind. Through that power will be opened a road which will lead to the end of man's struggle

for existence which will lead to the complete manumission of humanity from the curse of labour. No longer will man need to eke out a precarious existence with such small leavings of energy as nature so far has allowed him. Into his hands there will be put the means for arriving at energy unlimited, the boundless energy held together in nature itself.

To put such power, sir, into the hands of men whose thoughts are turned to unworthy pursuits—the pursuit of war, as an example—you will readily understand would be to invite misery and appalling suffering on the head of mankind. The secrets held by the League of the Covenant can only be given to the world under the strictest guarantees. Failing such guarantees, the League of the Covenant will turn its power to the swift destruction of the world, rather than such power, otherwise discovered, should destroy the world in conditions of prolonged misery and suffering.

The League of the Covenant will hand over to the new League of the Nations for Peace, together with the airship already proved invincible, secret weapons which will enable the International Arbitration Board to enforce its ruling on recalcitrant states.

In the event of your failure to inform us of a movement for convening the conference herein demanded, you are warned that at noon on the Sixteenth day of September, Standard Time, the capital city of Washington will be the object of a visit by the League of the Covenant, in circumstances where the shedding of blood will be inevitable. You are warned, further, to consider the probable effects of our anæsthetic alone upon the City at the time of full pressure of traffic.

This document was unsigned, but at the suggestion of Dan, who was terribly concerned at the prospect of the ultimatum being ignored, the Chief was persuaded to allow all three of our party to put their names to an addendum. Apart from my own desire that the authorities should treat the demands of the League understandingly, I was all too willing, since my father—and Kirsteen—would be informed that we were alive.

DEAR MR. PRESIDENT (we wrote),

In the hands of the League of the Covenant by capture, we have become certain that the power it holds cannot be resisted. In the air, no known craft is capable of carrying out an attack on the warship with the slightest success, and, scientifically, there is no known counter weapon or defence against the terrible devastating force embodied in the weapons of the League, so far unused in its operations. The purpose of the League has been truly stated.

(signed) JAMES V. BOON,
DANIEL LAMONT,
W. MILLIKEN.

Exit From the Plateau

FOR the purpose of forwarding the ultimatum to the President, a small town in Alabama was gassed one night, and the envelope containing the document was slipped into the box at the little postoffice. Then the raiders retired to the cavern of the plateau to await developments.

In the week that followed, no answer was forthcoming from the President, but we gathered from the news that was being broadcasted by the agencies that he had received the document. At first the ultimatum was considered to be a hoax—the *Merlin* party was under the sea, it was said, and the signatures were forgeries. Then came the word that my father and several others had identified the signatures, and the fact that Dan and Milliken and I were in the hands of the raiders was made much of.

The genuineness of the signatures being settled, it was then declared that our testimony to the power of the League had been secured under compulsion—a declaration not very flattering to any of my party. The raiders were putting up one big bluff, was the next idea—if the League of the Covenant had such an ideal purpose, why had it made off with so many millions in gold? "Fudge and Fiddle-de-dee!" said one journalist in a paper secured by another mild raid.

In some of the better journals that we saw readers were reminded of the gifts of radium, and it was demanded that the government should meet the members of the League as suggested. At least, said some of the editors, with an eye perhaps on sensational copy, let us have a look at the men who have bamboozled the best brains in Europe and America!—let us meet them and call the bluff, if it is a bluff.

The voice of America, so far as it was echoed by the newssheets, was all for calling the conference.

From the President, however, no direct reply came. He was reported in the newspapers to have taken up a strong attitude, a report that in my conception of Mr. Whitcomb as rather an obstinate and self-willed man I was inclined to believe. No negotiation with these pirates was said to be his pronouncement—let them exhibit their mighty powers if they desired—let them come to Washington on the day appointed, and it would be shown whether they were invulnerable or not! Was it at all likely that the raiders would give definite warning of a raid?—this too was mere bluff and braggadocio!

Altogether, it was difficult to find out what the President's attitude really was. No official interview was published. But by his very silence, the President seemed to assent to the attitude attributed to him. The week of grace elapsed, and no direct reply was received.

The raiders knew, from a question and answer reported from the British House of Commons, that the President had not issued any invitation to the conference demanded.

"In view," the report of the M.P.'s question ran, "of the appalling condition of business in the country, as a result of the continued raids of the so-called League of the Covenant, would the Secretary for Foreign Affairs help to allay the natural concern of the nation by indicating the attitude of the Government towards the conference demanded by the League?

"THE SEC. FOREIGN AFFAIRS: 'The Government is without official information regarding any demand for such a conference.'

"The HON. MEMBER: 'The honorable gentleman has doubtless seen the demand reported in the press?'

"The SECRETARY (shortly): 'Yes.'

"The HON. MEMBER: 'In view of the urgency of the situation, where an apparently invulnerable League with undeniably high ideals' (cries of "Oh!") 'demanded a conference of the Powers, would the Government not discard red-tape for once in a way, and take steps to make that conference an accomplished fact?' (Opposition cheers.)

"The SECRETARY (with considerable warmth): 'The honorable member is unfortunate in his choice of words. It must be obvious to him that no league of pirates is 'invulnerable,' and that however 'high' of 'ideals' as far as lip service is concerned such a League may be,

it is in no position to 'demand' anything from such a great nation as America—or as Great Britain.' (Loud cheers.) 'The honorable member is mistaken in believing that either of those nations is to be frightened by melodramatic vapourings into unheard-of concessions to a gang of criminals.' (Prolonged cheers.)"

From other European countries came reports suggesting that the various governments were opposed to the idea of conferring with the League. The raids had touched the nations in their most tender spots—their pockets—and resentment was bitter. The official slogan everywhere seemed to be: No negotiations with the pirates!

Knowing as we did the determination and purpose of the Chief, and the appalling power that was in his hand, we in the cavern were amazed at the folly and stubbornness of the President in particular and of the world in general. As the days went past and the date fixed for the raid on Washington approached, our apprehension deepened. We knew that the Master would carry out his purpose to the very end, even if indeed it involved the world's destruction. None of us doubted his power.

There was that about the little leader which put out of the question all doubt of his ability or will to fulfil his task to the last iota.

I have given, I am afraid, but a poor description of the personality of the Chief of the League. Words fail me when I try to tell of the power that emanated from that frail little man. But in the last days in the cavern, when the world seemed to hold him as naught, while the men round him went about with the shadow of death upon them, quietly doing their tasks with no diminution of energy or efficiency, the magnetism of the Master seemed to heighten. He held the men to him, though it seemed he had only death, swift death to offer them—since the world by failing to estimate the real value of his promise was sweeping to its doom.

To say that all the men composing the League of the Covenant accepted the situation nonchalantly would be to exaggerate, but that none of them faltered in allegiance to his Chief and the purpose of the League is simple truth. There was a set look on the faces of all the men. Even that licensed jester of the company, the insuppressible Lord Devonridge, developed an air of gravity, just as in the old days I have seen others of his kind develop that air when on the point of going over the top. That the normal gaiety of men would return in the case of Devonridge and others when once the "zero" hour was past, I was as certain as that the raid on Washington was inevitable. But until the actual moment arrived when the fate of the world and of the League would be decided, anything but real seriousness would have rung false.

I felt, myself, something like an innocent man in the condemned cell of the felon, but I had feelings to spare for experiencing a deep admiration for the courage and conduct of the men who had captured me. I thought it a great pity that such excellent fellows could not act as a leaven to humanity in general, for they made one proud of one's kind.

The two or three days before the sixteenth of September were devoted to conditioning both ships, for the two were to act simultaneously. From a small cave all the gold taken in the raids since March—minus that left in the Banque de France—was brought out and loaded into the ships. Every gas and spirit tank was filled to its utmost capacity, and every instrument thoroughly tested. Such of the ducks and chickens as survived in the cavern were given their freedom, and the personal stores of the men of the League were loaded into the ships. Nosey, the toucan belonging to Smithers, that unloquacious mariner, was given a perch aboard one of the vesels.

The Plateau of the Red Scar and its cavern system was being completely evacuated by the League of the Covenant, for failure could hope for no return. Success would make a return unnecessary.

We learned now that the reservoir of aithon gas was almost exhausted, which meant that the *Ark of the Covenant* would soon be without its marvellous lift, by which it had contrived to avoid bloodshed in its operations, and that its future invulnerability could only come from the exercise of its more ruthless powers.

Milliken and I were not excluded from the final meeting of the fifteenth. We were treated as members of the League, for indeed our sympathies were all with its purpose. Thus it came that we heard the Master speak to his followers.

"Gentlemen," he said in that level, clear voice of his, "before I do anything else, I have to thank you. I have to thank you for a devotion to the cause I have offered you, devotion such as has never been paralleled in history. But, gentlemen—my comrades—I am persuaded that our cause is worthy of even such devotion as yours.

"We take an offering of freedom to our brother man. Our gifts to him can be large. On the other hand, we may end by shattering him and the world he has known into fine particles of matter—for I dare not prophesy what the fate of the world will be if we are forced to use the height of our power. This we undoubtedly will use, before we brook that the smallest fraction of the freedom we offer mankind shall be negatived.

"I have had so many examples, such a revealing experience, of the high courage that animates every single man of you, that I am certain not one of you will falter in steadfastness to the last—even if that last should mean oblivion. But my faith is that our cause will prosper, that the League of the Covenant will triumph.

"Gentlemen, I salute you! With a deep pride I hail you a band of brothers worthy of their cause! And I tell you with that certainty which often comes to a man whose course is almost run that you cannot fail!"

That was all he said, with no attempt at eloquence or rhetorical effect, in that level, clear, unemotional voice of his. I thought they would have cheered him, but as he finished something like a sob—or half a sigh—went up from the assembled men. I suddenly understood. It was the first time that the little Chief had acknowledged the drain on his vitality from the great wounds on his frail body.

To see him there, so gentle, so still, and so lovable, and with the knowledge that his every minute was one of terrible agony, tugged at the heart-strings and brought a lump to the throat. It was easy to see why the men who faced him were ready to follow him to the death.

It came close to nine o'clock. The Master had been going round the men, shifting from group to group, talking to them quietly. He rose to his feet.

"Come, gentlemen," he said simply. "We must start on our voyage."

With Milliken, I was close to him when he spoke, and I turned to him on an impulse.

"Sir," I said, "may I follow you on my seaplane?

You have my word that I won't betray—"

He stopped me with a gesture of his one hand.

"Please, Boon, please!" he said. "I know you would never betray. It is not that. I know, believe me, that a man can come to love a machine as he might a gallant horse. But the end is not yet, Boon. The League of the Covenant will win—and in that case you will see your *Merlin* again. She may even do a last service to the League of the Covenant. I have in my mind a use for your plane. Trust me—will you, James Boon?"

"I'll trust you, sir," I sort of gulped. "And—and if I can say it in honour, sir—I'm hoping—I'm hoping ——"

I broke off stammering, and he put his hand under my arm with an infinite kindness.

"Why, that's well," he said. "I am glad that we are not enemies. Come—you shall sail with your friend Dan Lamont and myself on our ship—and Milliken, too."

The men were trooping silently out of the big recreation cave, and Seton and the Master, Dan, Milliken, and I, followed at the rear down to the hangar-caves. The *Merlin,* looking very tiny against the mass of the big ships, lay on a ledge between the two airship caves, and as we passed her, Milliken shook a float strut as in farewell, an example I had to follow.

"Hell!" whispered Milliken. "Isn't she just fine!"

And with a shrug of his big shoulders, my mechanic began to climb the ladder to the airship's gangway. I followed him, and in spite of the Chief's assurance, I felt sad to leave my bus.

Seton was in command of one ship with half the men as crew, and the other was in charge of the Chief himself, with Lord Devonridge as navigator. Milliken and Dan and I were with the Chief as he had promised. Seton's ship led the way, and when her hull had passed through the main mouth of the great cavern, our ship got under way. When we were beyond the big gates, Seton was ashore with a small party of men to close them. We saw the lights in the cavern go out, and the big flaps of the door swing to We mounted h gh, and below us hovered the silver hull of Seton's ship At the mouth of the cave some one ran by the basin's edge with an electric torch—Seton, I took it to be. Then even that light vanished, and presently in the dim light of dusk and the stars we saw the hull below us come up.

Seton's voice came, casual and familiar, through the Chief's highly sensitive radio phone:

"All aboard, sir!"

"Very well, then, Seton," the Chief said quietly. "Fall astern as we go. Everything as arranged."

"Aye, sir!"

A gesture from the Chief to Devonridge, and the great ship gathered speed. Into the night we sped—on to Washington.

CHAPTER IV

On to Washington

THE airships flew at a great height, a height I had never imagined would have been possible for dirigibles of such a low cubic capacity. We were breathing compressed air, all apertures being closed. No sign of earth lay below us and, except for the barely perceptible throb of the engines and the roll of that wonderful navigating globe, nothing indicated the high speed at which we were travelling. No lights were shown externally, but the glow of the stars in the tropical night was enough dimly to illumine the shape of our sister ship astern, a little to the side to escape the backwash of our six propellers.

After a steady progress of about seven hours the silver hulls were tinted by the first flush of dawn, while the sea of cloud far below us still lay unlit and inky. We were approaching Windward Passage, between Cuba and Haiti. Jamaica, though we could see nothing of it or of the sea, lay on our port bow ahead. Quickly the light grew, and the clouds under us, now paling to delicate green, began to break up into patches and to disperse. Then in a flash of time we saw through a break in the veil of cloud an arc of bright scintillating spots against the dark blue of the sea. The spots were planes, no doubt thrown out to intercept the passage of airships should they approach that way!

At a word from the Chief, one of the men turned a little wheel, and almost at once both ships floated in a thick vapour that soon dispersed in the air behind them, while a mass of it yet seemed to cling about the hulls. From below the effect must have been as of two slight wisps of extremely high cloud. We could not see the planes, nor apparently had they seen the airships, for half an hour passed and we picked up no radio or sign to indicate that we were pursued. The vapour was turned off

Day grew, and the ships were sailing in a cloudless sky. Below, the masses of Cuba and Haiti faded dimly into the west and southeast. Ahead, the Bahamas dotted the cerulean sea. The toe of Florida loomed up on the horizon, a blue smear to the north on our port bow. It was six o'clock, and we had been cruising nine hours. At the present speed we were still six hours off Washington. Here and there on the sea below us, the black dots of steamers were to be seen. One of these, almost grey in tone, sped faster than the others, and even at the distance it was easy to see that she was a ship of war!

White vapour suddenly wreathed the grey dot, and under the airships, too far below for harm, there mushroomed the saffron puffs of bursting shells. Then the open receiver of our ship's ordinary radio sung to the long-short of Morse.

"Four-fifty metres," the Chief said to a man called Sam Pester, and into the special radio at once, "Jam!"

Pester jumped for the key and began to rattle nonsense on it. The warship below still was partly enveloped in vapour, and the air under us was dotted with shell-bursts. Then, when we passed over her and she got the angle for guns of greater calibre, she opened fire with this heavier armament, throwing the big shells high above the airships

"Full speed, Devonridge," said the Chief. "We'll trouble them to find the range."

Devonridge touched the control, and the ship leapt to the access of power. The warship was left far behind, still throwing futile shells.

"That will do, Pester," the Chief said to the man who was still rattling the radio key. Then quietly into the special phone, "Seton!"

"Yes, sir."

"I don't think we need trouble to jam further wireless messages. The result of any message will only be to bring air-machines into our path, and I would rather we met them speedily than not. We shall have to send them down in any case, and I prefer that they should come down in the sea. You follow?"

"Entirely, sir," came the cool voice of the com-

mander. "But even so some of the pilots may be killed by drowning."

"We must take what measures we can to prevent that," the Chief made answer. "Let us hope there are ships about if we fight."

Now the radio of the warship began to speak unhampered, giving the position and course of the two airships The result of the broadcast was almost immediate.

Milliken touched my arm, and pointed down.

"A *Merlin*, Mr. Boon," he said.

Ahead of us and far below a bright silver speck was swooping up at an angle possible only to a *Merlin*. But I knew that she could not reach us, even if her cabin were airtight. It was far from certain that she would find the necessary resistance for flying in that extremely thin atmosphere about the airships.

"One of your planes, Boon," the Chief crossed over to say. "A *Merlin*, I think."

"Yes, sir," I agreed, perhaps a trifle gloomily. "A *Merlin*."

"We must deal gently with her," he said quietly.

Just then a voice hailed the ship over the phone.

"*Ark of the Covenant*, ahoy!" it said. "What's been done to Lamont and Boon?"

It was unmistakably the voice of Dick Schuyler. I turned to the Chief in enquiry.

"Answer him for yourself," the little leader said softly.

"We're all right, Dick," I cried into the transmitter. "We're both here—Milliken, too—and all well."

"Good for you, Jimmy," Dick's voice came cheerily, "Excuse me if I attack, will you?"

"Dick," cried Dan earnestly, "don't attack, for God's sake! You haven't a ghost of a chance!"

"Hello, Dan!' Dick hailed. "What's the matter with you—got the willies?"

"Dickie!" cried Dan, in an agony of apprehension. "I'm giving it to you dead straight. You can't attack unless the airship absolutely lets you."

"Shucks!" came the answer. "Where are you—bow or after cabin? I don't want to hit you if I can help it——"

"Ray D, Thetford—carefully," the Chief said, loud enough for his voice to carry into the transmitter, and a slight little fellow by the hatch manipulated an instrument.

We saw Dick Schuyler's *Merlin* sit back suddenly on her tail, and then flip over easily into her hovering descent. If Dick was piloting he knew his bus distinctly well

"Oh, hell!" Dick's voice came in a jerky wail. "Say, Jimmy—punch the fellow—who did that—in the—eye for——"

The ray must have flashed over his radio circuit, for his voice suddenly petered out. We watched the fall of his plane until she took to the water.

"Is your friend safe, do you think, Boon?" the Chief asked. "I would not have such a gallant fellow drowned ——"

"His machine's amphibious, sir," I replied. "He should be all right."

"That is well," said he. "And now we must attend to those others coming up."

Ahead, unnoticed in the interest we had been taking in the safe landing of Dick Schuyler, we now saw a swarm of planes, like bronze, silver, and golden gnats, fanned out about a thousand metres below us. These were *Merlins*, less speedy bronze Atlas machines, and Columbia fighters. There must have been a score of them altogether. I wondered how the Chief would deal with all that number. I was soon to learn.

"Seton," said the Chief, "take the right half of the approaching planes. D-1 ray at 5 aperture all four instruments. I take the left half."

The effect of the order was marvellous. The steady and exact formation of planes below suddenly was disintegrated. They had all been climbing, and some, particularly the bronze Atlas machines—which I had always thought of bad design—slipped into spinning tail and head dives that seemed beyond all recovery of control. Some of the little Columbias flickered down leaf fashion, tail and head, and others wing and wing The *Merlins*, I am glad to say, came off best, for they went down out of the first tail dive into the distinct hover.

"Glory be!" muttered Milliken beside me. "We *did* make 'em fool-proof! Jinks! But it's awful to see the others!"

"That squadron should be thankful for your *Merlins*, Boon," the Chief said. "They will be able to save the others."

"Won't they be after you again, sir," I asked, not a little amazed at his continued concern for his enemies, "when they find that their engines are all right?"

"That is just what they will not find, my dear Boon," the Chief replied a trifle grimly. "Not unless they are able to fit new magnetos. The windings of those that they have are ruined beyond repair."

"Heaven!" I exclaimed. "And poor Dick Schuyler was miles at sea!"

"You should observe more exactly, Boon," the Chief said kindly. "Your friend was treated to the D rays, not the D-1. He will find his engine in working order, for there is a difference in the rays."

"Eight bells, sir," boomed a deep voice behind us, "and Moggs's compliments, sir, but will you please eat your breakfast?"

It was Smithers, that stout seaman, who stood at the foot of the companionway, touching the peak of his cap.

"Ah, Smithers!" said the Chief. "And I suppose if I do not eat my breakfast, I shall have the excellent Moggs invading the cabin with a tray?"

"That's wot'll 'appen, sir!" Smithers agreed solemnly.

"The last remnant of feudal tyranny, Devonridge," the Chief declared. "The tyranny of the old retainer, transferred from you to me."

He slowly ascended the stairs to his cabin, and presently the reliefs came to free the men of the first morning watch. We had been flying eleven hours.

The Attack on Washington

IN the four hours that followed in the flight of the airships to Washington, countless hordes of airplanes were encountered. But these were dealt with without any slackening of speed or deviation from the direct course. The encounters had no features dissimilar to those of the disposal of the first twenty planes. No machines got to anything like attacking distance, for the Chief, who was back at his post by the controls of the forward cabin, had them sent down on sight.

Four hours of steady cruising and, jump at noon, the two ships floated high above Washington!

From all quarters of the sky planes and dirigibles were swooping towards the city like ravens to the kill. The air was thickly spotted with them below us, and

so densely were they concentrated that as an airman I marvelled that they escaped collision with each other. I have never seen such a concentration of air-machines.

Plane after plane fell as the terrible D-1 ray was directed on them, and the attacking dirigibles drifted away on the wind with their power gone. Down into the river and on to the sward of Potomac Park machines crashed, while some glided at flat angles away over the roofs of the city. In the short space of fifteen minutes there was not a single plane nor any dirigible in the air about the *Arks of the Covenant!*

Now with the sky clear of government machines, from over on the Virginia side, and from various positions round the city, high-angle guns set up an incessant and clamorous, thick barrage of shell-fire, but the height at which the ships were flying kept them immune. Round and round, in ever-decreasing circles, the two vessels swung, dropping gas-bombs as they circled, hundreds of bombs, it seemed, until the entire city was wreathed in pinkish vapour. Yet the guns still fired, and the puffs of the shell-bursts almost obscured the city from view.

"The gun-crews must have air-tight oxygen helmets, Seton," the Chief called through the phone.

"I'm afraid so, sir," was the reply.

"I am loath to explode their ammunition, Seton."

"I'm sorry, sir—but if we are to descend it must be done."

"Let us try a message first," the Chief said gravely.

He stepped to the phone.

"*Ark of the Covenant* to any in authority in Washington who may still be awake: Cease fire, or we shall be compelled to disable your guns to the certain death of your gunners!"

Instantly came the reply.

"General Commanding the Defence Force of the City of Washington to the *Ark of the Covenant:* Our guns will not cease fire until they have brought down your ships!"

"Then listen, General Commanding the Defences of Washington" the Chief said crisply. "We shall number the explosions for you as they occur. On the Myer heights emplacement—over there Thetford—Ray G. One!"

A gout of flame shot up from the rise by the cemetery and a vast plume of smoke, at the root of which buildings seemed to part, rent and shattered. The airship shook to a tremendous report. Danny covered his face with his hands, as did some of the men in the cabin. A terrible nausea seized me, and I felt sick and dizzy.

"Are you satisfied, General?" the Chief asked, a world of pity in his voice. "Or must we continue to take lives uselessly?"

"Damn you! Damn you!" the voice wept. "My poor lads!" Then with a snarl, "At them, boys!"

"On that round of green sward to the north, Thetford," the Chief went on inexorably. "Observatory Circle, General. Two!"

Again the gout of flame, and the flung plume of smoke, the scatter of high-thrown debris. Then a succession of flames and plumes—one mighty reverberation—and a series of minor thuds.

"God in heaven—it's horrible!" muttered Milliken. "Oh, God! Stop it for Christ's sake! They can't hit back!"

"General Commanding the Defences in Washington!" the Chief spoke clearly into the transmitter. "The blood of your men is on your head! What must we do to show you that our power is nigh infinite? Think, man—think! We are here to offer man freedom, not destruction—and it is you who force us to deal death to innocent men!"

"Hypocrite! Canting, humbugging, mocking devil!" snarled the voice.

"Cant, mockery, humbug are as far from our hearts as they are from yours with this slaughter weighing on it, General," the Chief said quietly. "Order your men to cease fire. There is no dishonour in a parley."

"No—by God! No!"

"If you believe in that God by whom you so glibly swear," the Chief said sternly, "think what you are doing! I will explode the ammunition of your batteries thus: Rock Creek Park, Howard University, Brookland, Bennings Bridge. I ask you to think! You cannot prevent us from descending on the city. To fulfil our purpose, we will slay every man you have, or raze Washington to the ground. How long will you abuse our patience? Must we destroy your men, lay waste the city? Shall I give the word that destroys your battery on Rock Creek Park?"

"God's curse on you——!"

"If God wills," the Chief said gravely. "Rock Creek Park, Thetford!"

Boom-r-r-rp! A long roar. And now no man in the cabin dared look outboard. Devonridge, his thin face sickly yellow under its sunburn, clung to the rod that stood out round the control-board, and his lips were moving. Little Thetford, the man who was manipulating the ray-projector, was the only man amongst us who had colour in his face, and he was crouching by the instrument, his eyes blazing with an animal-like devotion to the Master, his cheekbones flushed to hectic patches of red.

For a space no sound disturbed the silence of the cabin, save for the distant thudding of the helpless guns without the city, and the nearer crack of bursting shell. Suddenly the Master held up his hand.

"Gentlemen," he said in a hushed voice that could only carry over the super-sensitive phone. "I cannot go on. This piecemeal butchery must not last. I had thought it better that a few should die than that all should perish ——"

"Courage, Master," came the quiet accents of Seton. "The guns of the inner ring are silent. Speak to the general once more."

"General!" the Master cried in ringing tones. "I will not slaughter men piecemeal! I warn you that unless you give the word to cease fire, I will operate with such a power as will devastate the whole city—perhaps the whole world!"

"Stop, stop! Whoever you are—god or man or devil, stop!" came the voice of the general, pitiful in its surrender. "I have flashed the 'Cease fire!' I am trying to reach the President to urge that he agree to a parley, but I cannot get an answer from the Executive Mansion—indeed I cannot!"

"You are in a gas-proof observation station?" asked the Chief.

"Yes——"

"The White House has been gassed, and probably the President is unconscious. Give your word, General—not for our sake, but for the sake of the people of the city—that no attack will be made on us without warning, and we will descend on the White House to seek the President for ourselves."

"I give you my word."

"That is well. Do not move abroad without an oxy-

gen helmet. We will clear the explosion areas of gas, so that you can send aid to the wounded. Can you send aid?"

"That, thank God, best of all," said the General. "our ambulance corps is better equipped with oxygen helmets than any. I will see to it by ground telephone."

"Let the ambulance squads wear masks until they are in the damaged areas," the Chief instructed, "then let them take the masks off to do their work. Do you understand?"

"I understand," the general replied bitterly—"I understand your instructions. But you—you I cannot understand at all——"

"If you had understood us, General," the Chief said quietly, "this slaughter had been averted. But understanding will come to you. What is your name, sir?"

"Lee—all America will know it soon—George Lee, the man who failed to defend Washington!"

"There is that still to be shown by us, General Lee," the Chief answered, "which will prove how inadequate were the weapons at your disposal for defence against the power of the League of the Covenant. We shall look for you at the Executive Mansion in, say, half an hour. Give orders for all troops to be withdrawn from the White House area to as far as the Potomac and Rock Creek on the west, Eighth Street on the east, Massachusetts Avenue to the north, and Maryland and Virginia Avenues to the south. In half an hour no troops are to be within the confines of these boundary lines. Do you agree?"

"I agree. I will give orders now."

The first phase of the final raid by the League of the Covenant was over—but at a cost in human life that made the victory bitter.

The Chief Revealed

WITH the three terrible explosions of the ammunition wagons, and with the prolonged and heavy barrage of shell-fire that must have rained a deadly shower of fragments on the streets and roofs of the city, it was not likely that the White House had escaped without injury. It may be guessed, therefore, that I was filled with concern for Kirsteen Torrance, who, as far as I knew, still remained in Washington with her uncle, the President. True, the explosions had occurred at some distance from the Executive Mansion, but from some little experience of bombs and high explosives, and of the sometimes erratic nature of their effects, I could not be at all certain that the girl of whom I thought so much was safe and sound. To put my feeling quite plainly, I was filled with a dread that I could not shake off

It was with eagerness, then, when the Chief's airship had nestled down on the grounds in front of the White House, that I accepted his invitation to be with him and Dan at the coming interview with the President.

The anæsthetizing gas had been swept by the controlling rays from about the White House, and it was possible for the party of us to emerge from the gondola into the open air without masks.

When the Chief and Dan and I were on the solid earth, and the gondola had been drawn up, the ship rose to give place to that commanded by Seton. From this Seton came down to join us, and the party of four set out across the open space that separated us from the White House.

A deep quiet lay over the city, and no single human being was to be seen. The War and Treasury Departments on either side of us appeared to be utterly deserted, and the streets surrounding the Executive Grounds, normally so busy at this time of day, were absolutely still. The four of us seemed to be the only men left on earth. Above us, not very high, the two silver shapes of the airships lay poised as if dominating the sleeping city.

As we walked over the sward to the Mansion, no words passed between us. The little Chief, his massive head sunk on his chest, and his one hand held behind him, walked ahead with Dan, while Seton and I brought up the rear. The big fellow by my side was very pale and set of face, and though I cast a glance at him, he had none to spare for me. Somewhere in the distance, from the outskirts of the city untouched by the gas, came the sound of a blown trumpet, and the notes were taken up all round. Then the deep silence came again, all the deeper for that sudden burst of martial sound.

As we turned to go round the house to that little room giving out on the grounds, we became aware that a tall man in drab uniform was coming to meet us from the direction of the War Department. Dan touched the little Chief on the arm to draw his attention to the approach of the stranger, and the Chief stopped to await his coming. The soldier came up and, selecting the right man with a certainty that was revealing, he saluted the frail little figure in the shabby dark suit. Bareheaded as he was, the Chief bent forward in a courteous little bow.

"It is safe to take off your helmet, sir," he said. "You are General Lee?"

The soldier unstrapped the helmet with the help of Seton, and nodded.

"I am Lee," he said. "You lead the League of the Covenant?"

"I do," was the reply. "General, my hope is sincere that you have not suffered many casualties?"

"Full returns are not available yet, but I fear all three batteries are completely wiped out!"

"A great pity, General Lee," the Chief said gravely, "and a disaster I would have given much to avert. I deplore the necessity that destroyed so many brave ....."

"By God, sir," the soldier blurted, "I really believe you are sincere!"

"You will find us so, I trust," the Chief returned. "Let me introduce my companions, then let us walk on. My second in command, Commander Seton. Two gentlemen probably known to you, captured by us, Mr. Lamont—Mr. Boon. They are not signatory to the League I represent."

Dan flushed hotly.

"I have not formally joined the League," he said, "but I have to tell you, General Lee, that I'm with its objects heart and soul!"

The general stared in amazement. For very shame I could not stay out after Dan's avowal.

"I must say, too, that the purpose of the League commands my deep respect," said I.

The soldier passed his hand over his eyes with a gesture that was almost despairing.

"I can't make it out," he muttered. "I'm in a dream or something—I don't understand it at all——"

"Come, General," the Chief interposed gently. "Let us walk on. All that bewilders you will be made clear."

Without another word the soldier turned, dangling his oxygen helmet as he walked. All five of us, the Chief leading the way, made for the garden entrance to the President's room. We mounted the steps.

At that table on which the Chief had laid his first

letter to him, the President sat unconscious.

He was leaning forward over the table, his head resting on his folded arms, and it looked as if he had fallen asleep at his work. In front of him, and under his fingers, lay the ultimatum of the League. Beside it, with its receiver off the book, stood a telephone instrument. He had been in the act of phoning when the gas overtook him, for an oxygen helmet lay on the floor beside his armchair. He was alone in the room.

"Give me your helmet, General," said the Chief. "That belonging to the President is exhausted. He has left the tap full on."

The soldier obeyed, and very deftly then the little man put the nozzle of the helmet under the President's head. He brought a small case from his pocket, and took from it a hypodermic syringe and a tiny phial.

"Pull up the sleeve of his left arm, Seton," he ordered.

Seton obeyed, and having partly filled the cylinder of the syringe from the little phial, the Chief pushed the needle into the arm of the unconscious man, depressing the plunger.

"He will wake in a little," said the Chief, as he put the instrument into its box and back into his pocket.

In a minute or two the President stirred slightly and half lifted his head. The Chief of the League of the Covenant stood at the opposite side of the table, the light of the window full on his face. Slowly, all bewilderedly, the President raised his head. Then in a quite natural voice and with a faint smile, as his gaze fell on the face of the man at the other side of the table:

"Hullo, David," he said quietly. "Mamie's somewhere about——"

He broke off. Quickly the smile faded from his lips and eyes to give place to an expression almost of terror, as the full significance of that still, placed mask before him came to his comprehension.

"Almighty God!" he cried at the top of his voice. "*David Torrance! You!*"

Like the keen note of a swung blade of steel, the clear voice of the little Chief cleft the pause of deep silence that followed the President's shout.

"David Torrance is dead, Ben Whitcomb!" he said. "The man who was David Torrance died more than twenty years ago—died when the woman he trusted stole from him the work of many years to enrich the brother she prized more highly than her husband."

"Dave, Dave! you're wrong!" cried the President. "Mamie took your formula only that I might make money for you—to enable you to carry on your research in comfort. She had no thought for herself. She only thought of you! But the formula was useless—the first step was missing."

"I know," said the Chief. "I destroyed the record of it when I found she had taken the rest of my notes to America. Then I went out of her life."

"Leaving her to return to an empty home," the President said bitterly, "to die of a broken heart, Dave Torrance, even as she bore you a little daughter——"

"I know that now—though I did not anticipate it then——"

"That daughter is now safe upstairs. Shall I bring her to her father?"

"Wait!" Again that dominating note of steel. "Old mistakes—the apportioning of blame—these must wait! There are more important things to do, to discuss!"

The President reeled to his feet.

"Yes—Great God—yes!" he cried. "The raid—the airships—the League of the Covenant! What are you doing here, Lee? And you, James Boon? You, Dan Lamont?"

"Mr. President," the general said distinctly. "The city is invested by the League of the Covenant. All aircraft sent up against the raiders have been sent down—hundreds of machines. No American machines remain in the air, and the city is dominated by the ships of the League. After a vain endeavor to communicate with you, and following the complete destruction of three of our batteries of anti-aircraft guns by some mysterious rays from the airships, I decided on my own responsibility to agree on your behalf to a parley with the leader of the League——"

"The leader of the League," the President repeated dully, and fell back into his chair—"the leader of the ——"

He broke off as the general, with a wave of his hand towards the Chief, turned aside as from something that hurt.

"The leader of the League!" Mr. Whitcomb repeated in a whisper. "You—David Torrance—you!"

The little Chief bent his head, without removing his still, serious gaze from the stricken man facing him.

"Even I, Ben Whitcomb," he said evenly. "Come! I want you to see what your stubbornness has brought upon your city! Come!" The President rose. Both his hands covered his face as if to ward off some terrible vision.

The President Yields

THE order had been given to both airships to clear the streets of gas, and a big automobile had been brought up by General Lee to take our party of six through the city. We swept out of the grounds into New York Avenue, and at the corner of the Treasury we came upon an awful sight.

Several street cars had telescoped into each other, and passengers were lying unconscious among the wreckage.

"Stop! Stop!" the Chief cried. "This should not be! General, I withdraw my stipulation for a prohibited area. Find means to bring your troops, the sailors and marines, upon all points where work of salvage may be necessary! To it at once, man!"

"I can issue orders from the War Department, sir," said the general. "I'll go back."

"Tell your man to drive you there," the Chief insisted. "Let us lose no time."

The general gave instructions to the driver, who turned the car and sped to a side door of the State Building. When the general had jumped out, the Chief turned to the President in a terrible blaze of anger. In one normally so self-controlled such wrath was awful to witness.

"In spite of my warning, Ben Whitcomb," he said witheringly, "you did not have the traffic stopped in the Washington streets?"

"No," groaned the President.

"If I had imagined you could be so crass, so criminally obtuse, I would have averted the consequences of your folly. Rather than that this should have happened, I would have destroyed your power stations."

"I wish you had," the President exclaimed. "I did not believe——"

"Let us see the extent of this horror," the Chief said, back to his normal calm. "Go round by New York Avenue to Union Station, driver. No, wait for the general. It might be well that he should see exactly what has to be done!"

"It may easily be, sir," Seton interposed, "that our D-1 rays have been accidentally effective in stopping the street cars at most points."

"There is a slight hope of that, Seton," the Chief admitted. "I pray that it may prove to be the case."

Silence lay upon us in the car until the return of General Lee.

"I have availed myself fully of your concession," he said. "Orders are now being put through for bringing in salvage and ambulance parties to all cross traffic points."

"That is well," said the Chief. "Now I want your man to drive *via* New York Avenue to Union Station, then round the Capitol, and back by Maryland and Virginia Avenues."

"Do so, O'Neill," the general ordered.

Back again at the corner of the Treasury, we found a party of marines coming down New York Avenue to the smashed street cars. Close examination showed that the damage was not so extensive as at first had appeared. To me it seemed that the passengers of the car were victims of the gas more than of the collision, though blood was to be seen here and there. But the sight nearly unmanned the President. He sat with his face in his cupped hands, and did not look up until we reached the circle outside Union Station.

Troops and sailors already were at work among the wreckage here, and the Red Cross vans were standing by. Several street cars had been in collision, and one lay on its side upon the sidewalk in Massachusetts Avenue. The most of the trouble had come from automobiles running amuck. But though the scene appeared dreadful, it was obvious that the greater number of the unconscious had been gassed and little else. Numbers of people had been overcome by the anæsthetic in running for the shelter of the depot, and they lay horridly about the streets in all sorts of ungainly attitudes.

"My God!" groaned the President, as the automobile carefully threaded its way round the circle. "I cannot bear it! So many dead!"

"The greater number are merely asleep," said the Chief, "unless they have been struck by shell fragments."

He was peering about him as he spoke.

"You are right, Seton," he went on after a pause. "Many of the cars have been stopped by the rays. The work of salvage, General, will be made easier in a few minutes. It is close on two o'clock, and those affected only by the gas will be recovering. Let us go over to Fort Myer Heights."

The guns of the first battery had been disposed in the streets of the heights running east and west, and the damage to the houses about them was terrific. We were spared the sight of dead or wounded men, for already the medical squads had finished their work among the gunners, and were visiting the wrecked houses in search of civilian victims. In all cases the trucks of the guns had been overthrown by the explosion of the ammunition they carried under their tailboards, and one huge crater marked the site of the ammunition wagon of the battery.

There did not seem to be one whole pane in the entire district. The front of one high tenement had fallen clean into the street, exposing all the front rooms. There was something terribly pitiful in the spectacle of these rooms, all so different in their homely details. In one, a piano stood close to the exposed edge of the broken floor, a piece of music open upon its stand, and the flap of the keyboard up. In another, a table stood set for a midday meal with all the plates and glasses in neat array and undisturbed. A tiny kitchen had some flimsy garments on a line from one wall to another, and it was strange to mark how these had escaped the force of the explosion, while, in the very next room adjoining, the furniture and pictures were thrown here and there in a mass of undistinguishable debris. One could see where pictures had hung by patches different in tint from the rest of the wall-coverings. But looking on the scene became distasteful. It felt somehow as if one were prying into family secrets, into things usually screened from the gaze of the world

The people now were thronging the streets and murmuring subduedly in clusters about the doors. It was possible to look over the railway and the river along the prospect to the Capitol, above the dome of which, held steady in the sky, lay the twin silver shapes of the ships of the League. Towards these the people would gaze, only to turn when some new object of interest—such even as a crack in a house wall—would attract their apathetic attention. They were in a daze.

One cluster of folk about a house door parted, and a squad of Red Cross men emerged, bearing a stretcher. The form that lay so still under the spread sheet was terribly tiny.

"Oh, no! No!" gasped the President, with a quiver of his lips as though in actual pain.

The Chief stopped the car, and was by the side of the stretcher almost in an instant. The President followed him, as did Dan and I. An authoritative gesture brought the bearers to a halt, and the Chief lifted the sheet.

A girl-child lay under it, waxed-faced, terribly still.

Very tenderly, the Master stooped and examined the still, small figure.

"Ah!" he murmured, and the relief in his voice loosed the tension in us others. "The harm here is more apparent than real. This little child is one of the rare people peculiarly susceptible to the anæsthetic. I could indeed wake her as I woke you, Mr. President—but I will not mar the delicate fairness of this small arm even by the tiny mark of the needle."

He gently placed the bare wee arm back across the grubby little overall.

"Take her back to her bed, my friends," he said to the bearers. "Sleep is best for her. She will certainly recover."

We were back in the automobile, and the President was white and shaken.

"If the child *had* been hurt—if she *had* been hurt—" he kept reiterating in a low voice.

The Chief put his hand on the President's knee.

"If the child had been hurt, Ben Whitcomb," he said gently but sternly, "it would have been for you to see to it that she was the last of the thousands of innocents, the last child-victim on the earth, of the crime of war!"

"How, Dave—how?"

"By giving me that conference, man!"

"I have been blinded by my own obstinacy. I am not fit to be President," Mr. Whitcomb murmured slowly.

Then, after a pause:

"God helping me, David Torrance," he said clearly, "you shall have that conference—if I have to fetch each representative myself!"

We drove straight back to the White House in silence.

"You have won," I whispered to Seton.

"Almost," he answered laconically.

CHAPTER V
Kirsteen Learns

FATHER and daughter faced each other over the President's table.

Kirsteen's look was one of incredulous horror.

"My father!" she whispered.

"Daughter!" the Chief said gravely.

Accident had brought about a premature revelation of the relationship between them. The Chief had stipulated that the revelation should not be made until he himself was ready to make it. This stipulation had come as a relief to all of us who knew Kirsteen, for we had shared an apprehension that she would be deeply hurt when the identity of the Chief of that League to which she had shown herself so strongly opposed was made known to her.

The President, who had brought about the untimely exposure, could hardly be blamed. Unlike Seton, Dan, or myself, who by habit thought and spoke of the Chief by that title or as "the Master," the President could not think of him except as David Torrance, and in his emotion over the returns of dead and wounded, the name had slipped out.

"Thirty men killed and eighty-four wounded," he had said soberly, "in the army alone, which does not include the Air Service. In the civil list there are four killed and sixty-five wounded, some of them seriously."

"Of the four dead," the Chief had said, "none, I trust, are women or children?"

"By the mercy of God, David Torrance," the President had blurted, "only one woman appears in the civil list at all, and she is slightly injured."

Kirsteen, who was at the meeting in her capacity of personal secretary to the President, stiffened at the name. The remainder of us, in the tension of the moment, might not have noticed the slip, but the girl grew pale as death.

She half rose from her chair.

"What name did you give this man, uncle?" she whispered.

It was then that the little Chief rose to face her.

"Your mother's brother used the name I once bore, child," he said with that little air of gravity that sat on him so well. "He used it—as he used it before you were born—to the man who was his sister's husband—to the man who is your father."

"My father!"

"Yes—daughter!"

"You my father! You, an Ishmael on the face of the earth—robber and pirate—a slayer of men! You my father!—the father I have reverenced all these years as a good and great man lost before his time! Oh cruel! Oh, horrible!"

"My child," the Chief said gently, "I would have spared you the burden of this knowledge. Indeed I would. If in time you had come to understand the purpose that has put your father's hand apparently against all men, that has laid on him the sorrow of men killed and maimed—if in time you had come to understand the justice that has slain a few so that all might have freedom -then, and then only, might it have been made known to you that he who stands before you now was your father. It remains now to show cause why the hard names you put upon me, upon the true men who have supported me, are undeserved. You shall judge, child, with the full knowledge of what lies behind the League of the Covenant. Come with me. I will try to heal the hurt in your heart, child. Gentlemen, you must pardon me for a space——"

"Oh, what can you say to justify the terrible slaying of men—the robbery of banks—? Oh, what can you say? Can evil ever be done that good may come? Oh, uncle, uncle! Why have you hid this thing from me? And you, Jumbo!" She turned to Seton. "You that I believed so honest and true! Jimmy! And you, Dan! Give me comfort, one of you! You, Jimmy—you said before you went away——"

She held out her hands to me—thank God, to *me!* I took them in mine.

"Kirsteen," I said as gently and as directly as I could, for she was wild with despair—"Kirsteen, I went in search of a pirate and a robber, as I thought—and I found a man whose purpose I instinctively trusted, a man of deep and courageous thought, of clear and kindly aims. Trust us all, Kirsteen, for none of us has fallen from honour—neither Seton, nor Dan Lamont, nor myself—least of all, your father! Trust him most, Kirsteen! Say something for the Chief, Dan!"

Dan put his hand on top of ours.

"Kirsteen," he said gravely, "'way back there in March, when I first met you, I told you how I reverenced, how all men of my calling must reverence, the name of David Torrance. I can tell you now, right out of my heart, that nothing your father has done has robbed him of his right to that reverence. Rather, when the whole account is summed up, the world—and you—will find that he is worthy of the deepest love that can be given him!"

"Kirsteen," came the deep voice of big Seton, and his great paw fell on top of Dan's and ours, "take comfort. Go with your father. He can make everything clear."

"Kirsteen," said the President, and his hand too came on the bunch, "we have been wrong. Your father has been in the right. Go with him, my dear."

Kirsteen lifted her proud little head and her blue eyes were brimming.

"You all trust him so?" she whispered—"you men whom I trust most in the world? Then, I will trust him. I am ready—father!"

They passed out of the room, hand in hand, almost like trusting children. When the door closed behind them, each man of the four of us found something of interest on separate walls.

An hour passed and another before they returned. There was that illumining the grey eyes of Kirsteen which, in spite of the song at my heart, made me understand that my time was not yet, and that the day was for her and her father.

The Conference

FOURTEEN DAYS had gone since the raid on Washington, and these had been busy days in the chancelleries of the Powers.

True to his world, the President had sent out messages that brooked of no delay to all the Powers, and leading men of science, with representatives of all the nations, had been brought in *Merlins* to Washington. Ships of the United States and British navies had patrolled the routes by which the *Merlins* had brought back their passengers. The world was on tiptoe with expectation.

Milliken and I had flown to London in a machine built at Gardiner Bay, and we had brought back with us the aged, but still vigorous, Earl of Dunfour, Lord Almeric

Pluscarden, Professors Rutherglen and Boddy, and a number of secretaries. From France, Germany, Italy, Switzerland, Japan, and from other nations, men of like calibre to those passengers of ours had been brought with speed. Washington was crammed with newspaper men, and with a host of hangers-on who crowded up the hotels and boarding-houses.

I had seen my father, who had come to the city to consult with the officials of the Treasury, and the old man's welcome—though bluff and casual—had shown me that my disappearance had given him deep anxiety and sorrow. The meeting with him had not only shown me how much my father cared for me, but had given me a clear sight into how deep my affection was for him.

My story to Lord Almeric of our adventures and of the League had prepared him for the meeting with his brother-in-law, the Chief, and his lordship was ready to support the cause of the League to the best that was in him.

And now the conference in the White House was in full swing, under the chairmanship of the President. Over the Executive Mansion hung the twin shapes of the silver airships of the League of the Covenant. For the fortnight since they had descended on Washington they had been moored to two great airship towers in the Washington Channel, close to the War College. But at the opening of the conference they had unhitched to cruise above the building in which that frail little man in the shabby dark suit—he who had conceived them and given them their mighty power—faced the representatives of the nations and dictated his terms to them.

I shall not readily forget the scene in the big hall of the White House.

Round a horseshoe of tables, covered with green baize, sat men of all nations—swarthy Latins, fair Scandinavians, Semitic Prussians, Orientals, Anglo-Saxons—men of every race and clime. Where the clip of the horseshoe might have been sat the President, and by his side the slender, stooping, dreamy old English representative, the Earl of Dunfour. In the centre of the horseshoe, tables were set for the writers and secretaries.

Between the ends of the shoe was a solitary table. Two men sat alone here; one, the biggest man in the room, Seton, and the other, the frailest figure there, but the most dominating, the Chief of the League of the Covenant.

It seemed to me, as I sat near by with Dan Lamont among the clerks and secretaries, the little Chief was almost spent. His mind was keen, and alert as ever, but when he rose to speak he came but slowly to his feet, and his one hand rested on the great shoulder of the man beside him. Some of his phrases are memorable.

"The League of the Covenant, gentlemen," he said once, "is not on its defence. It is the world, as represented by you, which has to justify its position!"

Again:

"The printed paper before you, gentlemen, embodies the demands of the League of the Covenant. You are not here to discuss these demands. You are here to accede to them!"

They stormed at him, some of them.

"Why," shouted the German envoy—"why should we bear the insufferable insolence of this pirate? This hall is surrounded by the soldiers of the American Republic—why does not its President give orders for the arrest of this man and his accomplice and their bringing before a tribunal of the nations on charges of piracy and murder?"

"The Chief of the League of the Covenant is immune from any such proceeding," said the President.

"How immune? What immunity is to be given to criminal thief-dogs?"

"The Chief of the League of the Covenant is safeguarded by my promise of immunity," Mr. Whitcomb said tartly.

"I have no fear, Mr. President," the Chief said coolly, "that your promise will not be kept. But I should like to inform the gentleman representing Germany that he is talking into the receiver of a radio installation which is directly connected to the airships of the League, and that any attempt at violence to either myself or my second in command would immediately be followed by the anæsthetizing—at least—of the conference here assembled. I have to add, however, that the installation is not there as a safeguard, but simply that I may communicate with my crews."

The German subsided, a little white-faced.

Then rose the British representative, the Earl of Dunfour, slowly, to the great height that his scholarly stoop could not diminish. Gripping the lapels of his coat in that favourite attitude of his, he spoke to the conference with the grave courtesy that always distinguished him.

He deprecated at once the use of hard terms to anyone who was there, as they all were the guests of the United States. He thought that the indignation of the gentleman representing the German Republic was perhaps a little overdone.

The League of the Covenant had claimed certain power by which it was prepared to enforce its demands. Discussion of the demands, therefore, was a waste of time until it could be proved that the League had the power it claimed. Personally, he thought the reputation of the Chief of the League, whose identity now was made public, his reputation as a physicist, was almost a guarantee that the power was there. In addition, there was the fact that the conference had been summoned by the President of the United States, who apparently thought there was something in it. But, through the prescience of the Chief of the League himself, there was among the members of the conference a number of men greatly distinguished in science. These distinguished men were there for a purpose, which was to examine, on behalf of the lay members of the conference, the claim to power by the League.

If to the best of the understanding of the scientific members of the conference the power of the League was proved, it would then be for the representatives of the various nations to decide whether they could hold out against the demands of the League.

It might be wise, the earl added, if the members of the conference guarded against losing a real sense of proportion, otherwise they might be led to allow indignation over the demands—he was using, and had used, the word of the Chief of the League—over the demands of the League, or over its operations now happily at an end, to blind them to the wonderful benefits the League offered to mankind.

For himself, he would welcome any proof that the Chief of the League might be prepared to give for convincing the conference that both demands and offers had a real power behind them.

The Chief was on his feet immediately, and he thanked the Earl of Dunfour for a conciliatory attitude.

It was the spirit in which he wished to be met. The question was, what proof would satisfy the lay members of the conference? Of convincing the physicists amongst them he had no fear, but that which would prove the power of the League to men trained in science might not be sufficient for the other members of the conference.

"I am prepared to give proof that will satisfy every single member of this conference," said the Chief, "but you should be warned that there is grave danger in pushing proof too far.

"Three batteries of guns in this very city, fourteen days ago, were destroyed by an infinitely small demonstration of the power held by the League of the Covenant. To my sorrow, that demonstration entailed the slaying of thirty brave men and the injury of over eighty more. Do not ask me to slay any more men in demonstrating the truth of our power! It would have been the easiest thing, physically, for the League completely to have wiped out every weapon of defence in Washington, every man in arms—the mere turning of a thumbscrew would have done that.

"What will you have? Will you have us, in proof, wipe out forever one of the uncivilized peoples on this globe? We could do that.

"Will you have us destroy some unfertile island—blot it forever from your maps? You have but to come aboard the ships of the League, and cruise with us in search of such an island, and that proof will be given you.

"Will you have us disintegrate, for example, the earth's satellite, the moon? Let us then wait till nightfall, and even that will be shown to you.

"I ask you, however, to consider the consequences of pushing proof to such an extent. Let each of you turn to the man trained in science who is with you, and ask him what would be the result of releasing such a vast energy as would be let loose in destroying, say, the supposed unfertile island. I warn you, gentlemen, that the consequences might be far-reaching. They might indeed mean the complete destruction of this earth as we know it, the destruction of the universe itself!

"None the less, make no mistake. The League of the Covenant will shrink not even from destroying this globe, so that its purpose triumphs. It is for you to say what will satisfy you. I recommend you to accept the proposal of the right honourable earl and let your men of science accept proof for you!"

The Chief Proves It

AN hour or two later, a group of grave-faced men stood in the grounds behind the White House and listened enthralled to a lecture from the Chief. They had been pulled up in the gondola of the *Ark of the Covenant—I,* and they had seen the spectrum of the new gas *aithon.* They had seen proof after proof of the new force discovered by the Chief. And as he played with his instruments, so he played with the emotions of these grave scientists. He had them marvelling. He had them boyishly interested and keen to help him with his experiments.

For these men the question of whether there was to be peace on the earth or not was for the moment forgotten. To them the new discoveries were all, and their possible effect on a stubborn world was as nothing.

"It is beautiful, Torrance," Sir Walter Rutherglen had said, and had put his arm round the Chief's shoulders as round a loved brother. "Is is beautiful. I congratulate you with all my heart. You have made tyros of us all—eh, Boddy?—eh, Lamont?"

"Absolute plodders, Rutherglen—hewers of wood and drawers of water," Boddy had agreed warmly. "The most beautiful thing I have ever seen. Don't you agree, Lamont?"

"I have seen it before," Dan had replied, "but I haven't lost the thrill yet. A revelation!"

"Dot's der word, Lamond," a Dutch physicist, one Harpenkuypt, had agreed. "Id is indeed a revelation. ah, peaudiful! Peaudiful! Pud, Dorrance, my very goot friend, you will show us der effect of your ray on golt, eh? You bromised."

"Yes, I should like to see that," Sir Walter Rutherglen had exclaimed, and added hastily. "But not as a proof, my dear Torrance. We do not need that, I fancy. Just as an interesting experiment."

So they now stood in a group, these men of science, round the frail little man in the shabby black suit, in the grounds behind the White House. In a wide circle further off stood the statesmen of the nations, not quite sure what was going to happen, but deeply interested.

Above the gathering was poised the *Ark of the Covenant,* and from it ran down thick armoured cables for electricity. These connected up to one of the box-like ray-projectors which sat, oddly enough, on a plain deal chair, such as might have come out of a kitchen.

A little distance away, on a sheet of lead, a block of pure gold was set, one of the ingots taken from the Bank of England in April. It had been brought down from the airship.

Little Thetford was working at the box, and Dan was helping him, both flushed with excitement, and curiously alike with their fair hair and their terrier-like eagerness.

The Chief finished his explanation, and the scientists stood back, nodding to each other gravely.

"Are you ready, gentlemen?" asked the Chief.

"Just a moment, Torrance," said Professor Boddy. "We haven't an electroscope here—and a fluorescent screen would be of little use in this light. Now, what might one use to detect these subsidiary rays? Ah!"

He broke off and walked over to where a young foreign military attaché stood, in a gorgeously tasselled uniform.

"Excuse me, sir," said the Professor mildly, "but that tassel on your lanyard, cord, sash—whatever you call it—it seems to me to be silk?"

"I think it is," said the astonished attaché.

The Professor took out a pocket-knife, very much blackened by tobacco.

"I'd like to have it, please," he said simply, and held out the knife.

"But—but—it will ruin it!" blurted the attaché.

"Pooh! Tut! It won't hurt it, young man. I merely want to see the effect of the subsidiary rays. Your mother will sew it on again for you!"

And with the greatest nonchalance the Professor snipped the long tassel from the soldier's shoulder-knot.

"Excellent! Excellent!" breathed Professor Boddy. "Now, go ahead, Torrance. I'll electrify the tassel with my tobacco pouch."

"It won't work, Boddy," said the Chief. "Negative charges will predominate in this experiment."

"Let me see, now. Gold—lead. Why, of course they must," the professor muttered. "Bless my soul! How stupid of me!" He crossed to the red-faced attaché. "Young man," he said, "here's your tassel! I don't really need it."

The demonstration might have been likely to degenerate into a comic interlude, but the unamused acceptance of their confrère's eccentricity by the men of science rescued it from such a fate. Professor Boddy was taken quite seriously.

The Chief raised his hand to the airship and turned an indicator screw on the projector. There was something of a crackle from the box—and that seemed to be all.

But, lo! On the sheet of lead the ingot of gold was paling! It appeared to quiver for an instant, silver-like in colour, then it suddenly fell into fluid that ran in bright splatches about the sheet, greying as it ran.

Rutherglen, watching the change through a little angle-shaped instrument provided him by the Chief, gave a gasp.

"The green bar of thallium, by gad!" he exclaimed.

"Yes, Rutherglen," the Chief said calmly, "but not thallium now. *Lead!*"

He turned back the screw, then held up his hand to the airship.

The scientists crowded over to the leaden sheet, followed by the politicians, and Rutherglen stooped to pick up one of the small blobs of now solid metal. It was hot, and he tossed it about from one hand to the other. Others followed his example.

"Lead it is by gad!" said Sir Walter tensely.

"Yes, lead!"

"Wonderful!" said the German scientist, Steinmetz. "Bud id in no way broves dot der League of dis Covenand has der absolude bower you suggesd!"

"I agree with Professor Steinmetz," said a precise little Japanese, with envy peeping out through his politeness. "The power of the League is not yet proved."

"Nonsense!" said Rutherglen brusquely. "Think of that ray on a battleship!"

"You shall have ample proof, gentlemen," said the Chief softly.

Once more he held up his hand and waved it to the airship. The *Ark of the Covenant* came lower, and the gondola came down from it.

"May I trouble you all to come back to the ship?" asked the Chief.

"What's up, Danny?" I whispered. "What is the Chief going to do?"

"Nothing," said Dan. "Mathematical details."

He gripped my arm and shepherded me with the rest into the gondola. Once aboard the ship, the scientists trooped into the Chief's cabin, and disposed themselves about the place.

"Gentlemen," said the Chief, "I keep back nothing but the nature of the cathode producing the rays, and certain details the secrecy of which I must preserve. I ask you, Sir Walter, and the rest of you, to examine these papers."

No word was spoken in the cabin for the next hour. Sir Walter sat at the table, and when he had finished with one paper he handed it on, and took another from the Chief. Now and again some man would sigh or grunt over a point grasped, but these slips of paper, apparently torn from a child's writing-book, riveted their attention.

At last, the Master held only one single sheet. Sir Walter disposed of the preceding one, and held out his hand.

The handsome old Englishman took one glance at it, frowned deeply, then figured a little on a scrap of paper by his side. Red suffused his face as he stood up and held out his big white hand to the Chief.

"Yes, by gad, Torrance," he half-whispered. "Yes! It makes the brain reel—but, yes!"

The paper passed from hand to hand until at last it came to Steinmetz and the Jap. When they looked up, Rutherglen spoke.

"Gentlemen," he said quietly, "the game is up! The League of the Covenant has won! David Torrance, I congratulate you as a scientist on the most marvellous single-handed piece of research that the world has ever seen, and as a man on the greatest discovery that has ever helped mankind to raise itself from the mire!"

He turned to the gathering.

"Gentlemen, we must be unanimous in expressing our view to the conference. Are we agreed?"

"Id is inevidable," grunted Steinmetz. "David Dorrance, I salude you! We are sgool-children combared with you. Hoch!"

"Do you return with us to the conference, Torrance?" Sir Walter asked gently, for it was evident that the little Chief was almost spent.

"No, Rutherglen, no. Lamont and Seton will speak for me. I shall see you by and by."

They trooped out to descend from the airship, and as I reached the door last of all, I turned almost instinctively. I had just time to run back and catch the Master before he fell.

The Surrender

FOR the next three days Seton faced the conference alone. In vain did the delegates throw themselves against the stone wall of the big man's imperturbability. They would have pared down the scheme of disarmament set out by the Chief, but Seton was inflexible, perhaps all the more inflexible because his leader lay unconscious in the cabin of the *Ark of the Covenant*.

None of the delegates knew that the Chief of the League could not appear. They thought that he was by his instruments in his airship, ready to enforce the will of the League. Only the President, Lord Almeric, Sir Walter Rutherglen, and Kirsteen, outside those attached to the League, knew the real state of affairs, and in the conference the three men, with the Earl of Dunfour, steadily supported Seton. Kirsteen sat by the side of her father, as did Dan Lamont, once he had stated the scientific case for the League.

Steadily, point by point, Seton fought his battle, winning all along the line. And when the last paragraph of the scheme of disarmament had been agreed to, he set out further points concerning the League of the Covenant.

One of the ships of the League, with all her instruments intact, was to be handed over to an international board, and she was to be used only for enforcing on recalcitrant nations the rulings of the New League of Nations for Peace. She was to be permanently berthed in Washington.

In the hands of an international science board, presided over by Dan Lamont, as nominee of the League of the Covenant, the discoveries of the Chief were to be made public under sufficient guarantees that the power they embodied could not be misused.

The members of the League were to be immune from any prosecution on the score of the operations of the League. They were to be compensated for their three years exile and for their work, sufficient capital being given each man to secure him an income for life. Such members as desired to keep their positions on the

airship were to be retained by the New League for Peace.

The whole cost of the campaign of the League of the Covenant was to be made good. The gold taken on the various raids would be returned for distribution to the several governments. Lord Almeric and my father agreed to work out the financial details involved.

In vain, when the signing of the treaty became imminent, did some of the delegates protest that they were not plenipotentiaries. Seton grimly told them that they still had a day or two to obtain full powers from their governments. If not——! He shrugged his big shoulders.

On the evening of the third day, the Chief opened his eyes. Seton had just come back from the conference. Kirsteen, Dan, and I were already in the cabin.

"This is the third day, isn't it, Kirsteen?" he enquired. "I have been unconscious three days?"

"Yes, father."

"Is Seton here?"

Seton stepped out from behind the cot.

"Here I am, Master.'

"How goes the battle, Seton?"

"We are winning, sir. To-morrow they will sign."

"That's well," said the Chief. "To-morrow I shall be abroad again. I must rest. I will sign at noon to-morrow. Goodnight, Kirsteen."

He fell asleep. It seemed impossible that he would recover enough to sign the treaty on the morrow, but when noon came the Chief of the League was back at his old seat in the conference.

He was the last man to sign.

The treaty that abolished war on this earth was an accomplished fact!

The Master rose slowly to his feet

As he began to speak, a deep hush fell on the assembly. He spoke for half an hour, and when he had done, men around him were openly crying. Hun and Frank, Russ and Finn, Scan and Latin, Saxon, Goth, Oriental—men of every shade of skin from jet to ivory—he moved them to the depths of their souls.

Yet, he only spoke to them of man's ceaseless struggle for existence since the beginning of time, of man's hope for the future. His one hand never moved through all his speech from its resting place on Seton's shoulder. His voice never held a trace of emotion, nor did it ever soar or deepen for rhetorical effect. He only spoke right on, simply, directly, levelly.

"Gentlemen," he finished quite gently, "I congratulate you!"

Still the hush held the assembly. Near the White House a clock chimed the half-hour. The Chief tapped Seton on the shoulder, and the two went out of the conference hall side by side.

Seton came for me at six o'clock. He was terribly grave.

"The Chief wants you and Milliken to come with us to the plateau," he said directly

"To the plateau!" I exclaimed.

"Yes. We are to go in the *Ark of the Covenant—I*, ten of us, including Dan Lamont. We are to leave the Chief there."

I stared at him.

"Don't you see, man? The Chief is dying—his will is giving out. He says he can only hold out another day——"

"Good God!" I cried. "And Kirsteen?"

"He is with her now, poor child. It is their last farewell on this earth. You'll have to be good to that girl, Jim—afterwards."

"I will, Seton -I will."

"I'm certain you will, old man. Stand by. I have to go and summon the men, those that are not coming with us, to say good-bye to the Chief," Seton said. "Kirsteen might need you——"

"I don't think she will, somehow," I said soberly, "but I'll stand by in case."

He went off, and I took up my position in the corridor outside Kirsteen's room to wait. Half an hour passed, and the Chief came out—alone.

"Ah, James Boon!" he said softly. "Seton has asked you to come with us to the plateau? We need your *Merlin* to bring the men back."

"Yes, sir," I said with a gulp.

"Give me your arm, James," he said. "You will take care of Kirsteen? She has told me of you."

"I will, sir, I promise you."

"She is brave—she comes of a brave stock," the Chief went on gently, "but she will need all her bravery, all her understanding. You will try to make her understand how, my task being finished and my course run, I had to go back whence I came?"

"I will try, sir——"

We were walking out of the House now. Out on the sward of the grounds, thirty-eight men of the League of the Covenant were drawn up as if on parade, and beside them was a small group consisting of my father, Lord Almeric, the President, Sir Walter Rutherglen and Travers Lippencott. Down the ranks of men the Chief passed, and shook hands with each man. They gazed at him dumbly. Two men I saw join hands in an endeavour to help each other to self-control, locking their fingers held stiff-armed by their sides, and more than one when the Master was past frankly covered their faces with their caps. The stolid Smithers was the only man quite articulate, for when the Chief gripped his big fist, he managed to rumble out:

"God bless ye, sir—and gi'e ye quiet haven!"

The little Chief looked right into the stout seaman's eyes and that little air of gravity came into his face.

"A wonderful wish for me, Smithers," he said. "Thank you with all my heart."

It was strange, maybe, that the silent Smithers suddenly found speech, and that so aptly, for of the group of educated men who still remained, two of them related to the Chief, none found words. They could only grip his hand silently

Silently the Master passed into the gondola, and we of his crew, but for those already aboard, with him. On reaching the deck he went straight to his cabin, with merely a nod to Seton. Seton ran down the companionway and touched the controls. The ship began her last voyage.

On the sward below the two ranks of men stood bareheaded, as did the little group of five. All were silent, nor could one see the white of an upturned face.

But from the boundaries of the Executive grounds, where the people of the city stood in dense number, there rose the sound of cheering. I wondered if they knew, these people whom he had set free—if they knew just why they cheered.

EPILOGUE

The Death of the Master

WE had to carry him ashore in his cot, he was so far spent.

He was quite conscious, and when he had

(*Concluded on page 368*)

The INVISIBLE Raiders

By Ed. Earl Repp

"Look at the screen!" Colonel Brigham shouted savagely to the professor and pointing [illegible] screen. "The thieves are at work on the *Jupiter* and not a single federal craft is in sight."

THE INVISIBLE RAIDERS

"I TELL you we've got to put a stop to those raids on commercial aviation, Captain Wollack! What have you to say for yourself this time? Another excuse for your failure I suppose!"

Captain Milton Wollack, youthful commander of the Mid-West Division, Federal Aero-Police, squirmed disconsolately in a chair in the office of his chief Colonel Brigham. The sting of the colonel's words grated on his ears as he stared at the floor, his thoughts racing over the events of the past ten months.

True, for a year filled with troublesome days for the aero-police, a well-organized band of air pirates had ravaged mercilessly the air lines between Los Angeles and New York. The sad part of it all was that not a single clue as to the identity of the raiders had been obtained and the big air-freighters continued to be sacked in mid-air right under the noses of the flying police. They had not so much as caught even a glimpse of the pirates of the upper-reaches.

Needless to say that he, Captain Wollack, over whose division the raids consistently occurred, had worked ceaselessly in his efforts to apprehend the raiders. But with such little success that the entire nation was beginning to whisper behind the broad backs of the Federal Aero-Police Executives.

On several occasions, the captain recalled, although his men never remembered even brushing aerofoils with the raiders, yet machines had returned to earth bullet-ridden and in a quandary. That they had encountered the raiders, was obvious. But more than that the police did not know.

Captain Wollack straightened suddenly and eyed his chief squarely.

"Colonel Brigham," he said, "I've told you before that we've done everything within our power to apprehend those raiders. We have covered every square mile of territory within my division in search of a possible hide-out where they might secure themselves between raids. True, they have boarded the big air-freighters right under our noses and escaped with valuable loots. You are aware that my division is comprised of the very finest men obtainable in the country. Yet no less than a dozen of them have been shot down or forced out of the air by the uncanny raiders. If you will answer just one question that I have to ask, I'll have the bandits within thirty-six hours. If I should fail during that time, I'll resign and leave the country forever!"

ED EARL REPP

AGAIN our versatile author steps forward with an unusual story with situations which, although remarkable, may come to pass in our swiftly moving world

The question of invisibility has come up very frequently in the past and was given a great deal of publicity during the war when camouflage was used to successfully hide even large vessels.

Invisibility in the air, even to-day, is not at all impossible. Indeed, it has been accomplished many times. It is now possible to paint an airship or airplane in such a color that it actually merges with the sky and when viewed from a few thousand feet away, is totally invisible. Sooner or later, some inventor will, for war purposes, design an airplane with an outer covering that can be changed chameleon-like by means of electricity or electro-chemical means, whereby the craft can take on any color desired

Of course, in the present story the invisibility is produced by an unusual means, but even that type will come about and sooner than we expect.

The colonel scowled.

"I put you in charge of a thousand men and planes, and now you expect me to tell you how to catch a gang of crooks to boot! Is that it, Captain Wollack?" he shot, sarcastically.

Captain Wollack paused for words with which to express himself.

"Well . . . hurry up!" the colonel shouted. "While we are getting nowhere, those raiders are making us the laughing stock of the world!"

"Alright, Colonel! Answer this!" Captain Wollack said, finally. How in hell can we apprehend crooks we cannot even see?"

"What do you mean—you can't see?" the colonel replied scornfully.

"Just this!" Captain Wollack said flatly. "The raiders are strangely invisible! They fly aircraft that are as invisible as a black cat in hell! And to top it all off effectively, the screws of their ships are as silent as the Sphinx!"

"Bah! You talk like a poppy addict!" the colonel scowled. "Can't see an airplane in mid-air! What kind of men have you got under you? Are they a bunch of blind bats?"

Captain Wollack half turned away to hide a rage that was mounting steadily in him. His chest heaved with resentment at the scoffing words of his chief.

"Well . . . Colonel," he said, shaking a trifle. "If you called me to Washington just for ridicule, I'd better leave at once. But you better listen to me, sir! Those raiders are going to remain invisible until some method has been found to force them to visibility! At present they are absolutely invisible to the naked eye!"

Colonel Brigham laughed outright.

"Why you blithering young fool!" he snorted. "Don't stand there and tell me that such a thing as an airplane cannot be seen in mid-air! That's absurd! Let *me* tell you, Wollack, that everything material is visible! The trouble with your division is that it don't give a damn whether they see the bandits or not! They're a bunch of blind bats and I'm going to clip their wings in short order if you don't obtain results in a hurry! That's final!"

The captain picked up his hat and walked toward the door. Colonel Brigham beat nervously on his desk with bloodless knuckles and chewed savagely at a frayed cigar. As Captain Wollack reached the door the telephone on the colonel's desk jangled. He glanced around at his chief. The executive nodded.

"Just a minute, Wollack!" he said, picking up the receiver.

The executive seated

growled a hello into the phone. Impatiently Captain Wollack paced the floor in a little circle near the door, raging inwardly.

"Oh, yes, Professor," Colonel Brigham was saying into the phone. "I'd be glad to have you. You can be up here in ten minutes? That's fine! I have something to ask you. Certainly, sir! If your plan is feasible we'd be willing to give it a try. We'll do anything to apprehend those bandits. . . . yes, Professor, I'll wait for you. Good-bye, sir!"

He slammed the receiver into its hook.

"Sit down, Wollack," he invited, calmed somewhat. "Martin Standish, professor of physics at Washington University, is coming in to explain some plan he has evolved for the detection of objects invisible to the naked eye. He seems to have something up his sleeve. Sounds suspiciously like what you've been talking about. You might like to hear him. Old friend of mine. Now tell me just what you have been doing to catch those damned pirates."

"There's not much to tell that you do not already know, sir," he said. "But I'll tell you of an experience I had with them personally a fortnight ago."

Fighting the Invisible

WITH a vividness that might have been credited to a professional spinner of yarns, Captain Wollack related his personal encounter with the pirates. Colonel Brigham listened intently.

Wollack had selected a squad of four planes to accompany him into the air. Swiftly they ascended to the airlanes in which cruised the huge freight carrying liners, expressing valuable cargoes from the Pacific to the Atlantic coast. On schedule time the great air-freighter *Vega* hove into view from the west and Captain Wollack and his squad assumed protective positions a hundred feet above her broad aerofoils. Like trained falcons they hovered over the *Vega* for miles to the eastward—then suddenly out of a clear sky had come the staccato throb of machine gun fire.

The captain and his men searched the skies for the source of the fire. The heavens were uncannily void of craft either above or below them, yet singing slugs hummed perilously close to their heads and sieved their fuselages and aerofoils dangerously.

Occasionally Captain Wollack heard the hiss of air rushing through the struts of the invisible craft. He throttled down his twin motors and signaled to his men to do the same. He thought he heard a sneering laugh in the silence that followed the throttling of the motors, and once he could have sworn that he saw vivid streaks of flame suddenly appearing out of a blank sky. Slugs ripped his leather jacket and he swung his plane into a barrel roll to observe the entire heavens

As his ship rolled over, Captain Wollack's eyes searched the skies below. Far toward the earth spun a faint, red dot. He watched, hoping that the tumbling, vermilion ship would right itself and zoom upward again. A shiver ran through him as the craft suddenly became a ball of fire and disappeared with a barely audible crash. He shot a glance overhead as his ship righted. Three red ships of his favorite squad were flying upside down. He could see the faces of his men peering intently earthward. The captain let out a curse and looped to come above them. The fact that but three of his squad remained in the air told the story plain enough. One of them had been literally shot from the skies by the ruthless fire of the invisible raiders!

With the hope of ramming one of the raiding ships, Captain Wollack raced his motors and began a series of terrific maneuvers. Despite the fact that such a collision would mean his death, the captain decided to risk it in hope that he might land safely even with shattered aerofoils, bringing down with him one of the raiders. The capture of one of them, he thought, would mean the eventual roundup of the rest.

But the raiders were not to be caught so easily, as the captain soon learned. At terrific velocity he zoomed and rolled his ship. Frequently he heard the rush of wind through alien struts and the low, almost inaudible throb of screws told him that he had come near to his objective. Once he felt his aerofoils scraping something solid. He braced himself for the collision that he thought would follow. He heard a laugh coming from his left and he cursed.

Twisting the controls he shot the ship suddenly to the left. Instantly there came a rending crash. He grasped the control wheel tensely as the ship quivered under the impact. Glancing out over the left wing of the aerofoil he noticed that its pointed tip had been torn to shreds. But nothing clung there, not even a fragment of an alien ship. He peered straight ahead. The *Vega*, racing far to the eastward, seemed serene enough but the captain was shrewd enough to guess that she was being pilfered while the flying police were being engaged in the skies behind her.

Disgusted, Captain Wollack wiggled his ailerons, signalling to his three red ships to follow him earthward. It was useless to attempt to fight the unknown which hurled a few parting slugs at the police as their red craft hurtled earthward in close formation.

"So you see, Colonel," Captain Wollack said presently. "We've done about all we can under present circumstances to apprehend those bandits. I've lost some of my best men and risked my own neck for some clue as to their identity. It will take more than plain nerve to get at them, sir!"

"But what makes them invisible, Wollack?" Colonel Brigham asked

"If I knew, Colonel," the captain replied seriously. "I'd have those pirates in jail within forty-eight hours!"

A Demonstration

ABRUPTLY the door opened and the colonel's secretary ushered into the office the squat form of Professor Standish. He stood for a second just inside and deliberately laid a rather heavy, square box on the floor.

"Come right in, Standish," Colonel Brigham invited, rising. "This is Captain Wollack. We were just having a chat over the air raids. Have a chair."

Captain Wollack acknowledged the introduction politely. He offered the scientist his chair and pulled another close to the desk. He studied the professor for a few brief seconds. The latter was a rather small man, but his eyes sparkled with the power to penetrate into deeper things, to probe them and analyze them at a glance and get at the bottom of their meaning. His broad high forehead bulged, indicating a thinking brain behind a row of wrinkles that coursed across his brow from temple to temple.

"We were also discussing invisible objects, Standish," the colonel said, "and I can't convince Wollack that everything material is visible to the naked eye. What do you say?"

The scientist studied the executive for a moment.

"Well . . . , I disagree with you, Colonel, and I can prove that material things are not all visible in a way

that will convince you that you are wrong," he replied without the slightest trace of arrogance.

Professor Standish arose and strode swiftly to the box he had placed on the floor when he entered the office. Colonel Brigham stared after him and Captain Wollack bent forward when the rasp of dry hinges brought his attention to the box. The scientist swung back the lid and carefully lifted a compact, bell-shaped instrument into view. He placed it on the colonel's desk and glanced around the office.

"I'd like to assemble this model Radio Eye near a window, Colonel," he said. "Do you mind if I use that table over there?"

"By all means, Professor," the executive replied, striding over to remove a row of books from the table. "Here, Wollack. Give me a hand, will you?"

The heavy table was lifted directly under the open window. Professor Standish placed the instrument upon it with the open bell portion exposed to the light. Into the open end he fitted a disc of polished quartz and adjusted the apparatus so that it faced the sky

The two aero-police officials watched the scientist with interest as he worked on the instrument. He carried the box to a convenient position near the table and from it removed various attachments which his deft fingers quickly added to the bell. Several oddly-shaped vacuum tubes of shining metal and crystal were placed into position in accommodations around the instrument. Induction coils and outlet vents of high frequency principles were finally attached and then the scientist centered his attention on the installation of two, rather large flexible tubes. One of these he attached to a small oblong screen which he placed in the open window. The other was run from the base of the instrument toward the center of the room, near the wall where the free end was assembled to another screen perhaps three feet square.

In front of the large screen the scientist placed a sheet of metal gauze. Behind this he slid a board of thick, black parchment and then suspended the screen from the wall. To the bottom frame he attached a metal box to which he connected several loose wires that hung down in back of the square.

The scientist stepped back and reviewed his work with satisfaction.

"Gentlemen," he said, "that is the result of fifteen years of research! Since 1929 I have been working out the principle of that device with the hope of revolutionizing warfare by way of forwarning the nation of the approach of hostile aircraft. Exactly one week ago today I perfected it. It will prove that everything material is *not* visible to the naked eye, Colonel."

The executive eyed the professor incredulously.

"Well, Standish," he said impatiently. "Let's see the thing work!"

"I am waiting for that cloud bank toward the east to roll a trifle farther north, Colonel. This model is a stationary one and cannot be adjusted to any angle as could a more adaptable instrument, without creating certain vibrations within it that would interfere with perfect reception," the professor stated.

"What has the cloud bank to do with your little experiment?" the colonel asked.

"It will furnish the screen of invisibility behind which will hide your material objects, sir," Professor Standish replied, scanning the sky.

"Will your instrument penetrate that heavy bank of clouds and reveal objects on the other side of it?" Captain Wollack put in, amazed.

"It will, Captain," the scientist said. "Objects behind that cloud will be transmitted from the instrument onto that large screen on the wall. This model was designed especially to penetrate and neutralize heavy fogs, smoke screens and cloud banks. But I have discovered that it is capable of performing even a greater feat."

"What's that, Standish?" Colonel Brigham asked, studying the device.

"The eye of apparatus will penetrate the invisible atom with such accuracy that it will reveal its electrons revolving around a nucleus in the same precise manner as our planetary system revolves around the sun," the scientist explained.

"Quite interesting!" Colonel Brigham grunted. "But what has that to do with forcing those pirates into visibility, sir?"

"More than you think, Colonel," replied the professor, smiling. "I am fully acquainted with the invisibility of the planes flown by the pirates. And in explaining the super-sensitiveness of the Radio Eye in the field of the atom, I was merely paving the way toward an explanation for the detection of those craft."

"I thought the invisibility of the pirate ships was not generally known, Professor," the colonel added "How did you know about it?"

"Now don't go suspicioning Professor Standish, Colonel," Captain Wollack laughed. "If he had anything to do with those pirates he wouldn't be up here trying to help us capture them!"

"No, no, Standish!" the executive put in hastily. "I did not mean to insinuate. . . "

"Of course not, Colonel," the scientist replied. "You see, I have a nephew, Lieutenant Jack Standish, in the service under Captain Wollack's command, and he explained the situation concerning the failure of the aero-police to apprehend the flying criminals. He informed me several weeks ago of the invisibility of the planes. And his insistent demands caused me to concentrate more deeply on a medium for neutralizing invisibility. However, let us begin our experiments on that cloud bank. It is in the right position now and there will be any number of planes hidden behind it."

A Case of Infra-Red

WITH a stride the scientist was at his instrument. He bent down and inserted a plug into an electric light socket on the baseboard near the floor. Instantly the apparatus hummed softly and the various tubes arrayed at its base became brilliant with vari-colored hues which even in the light of day made little circles of illumination around the bell.

"The principle of the *Radio Eye*, gentlemen," the scientist said, "is very simple once you have learned to control the high-frequency radiations of light. Take the infra-red, that portion of radiation which has a wave-length too long to be observed with the human eye, for instance. This radiation gives out a large amount of heat at low temperatures, but at higher temperatures, shorter radiations can be given out as well. These radiations can be measured with the bolometer, an instrument which I have embodied in the *Radio Eye* for the controlled projection of my neutralizing beams. Infra-red rays are invisible in themselves yet they are sixteen times as penetrating as ordinary light beams. I have embodied the infra-red radiations in the instrument as the medium for penetrating and neutralizing invisibility. By the measuring system of the bolometer I can control these beams at

any distance, permitting the top of the beam to stop on an ordinarily invisible object and neutralize that object's invisibility, projecting the images upon the reproduction screen.

"At the far end of the beam which the *Radio Eye* projects and retracts in the form of regular light rays for reproduction, we find the lowest vibrations of light which the human retina is able to perceive. This is the color of red in its very deepest known shade. It has a high frequency vibration of 400 trillions per second. Thus the infra-red beam with its almost inconceivable rapid vibratory radiations is the medium I have adapted for utilization in the *Radio Eye*. By watching the screen I can gauge the length of my neutralizing beams through the controlling acumen of the bolometer. Images on the screen will tell me that my beam has touched objects. Should the ray be longer than the distance between my instrument and the objects, the beams would have no effect on them, but would pass through their surfaces into the beyond without neutralizing their invisibility. By gradually adjusting the bolometer by dial control, I can lengthen or shorten the infra-red beam to the required length and hold it there with results that the tip of the beams illuminate objects, so to speak, the vibratory frequencies causing a complete neutralization of the invisibility that enshrouds them.

"Now we'll work on that cloud bank. By slowly releasing the infra-red beams, controlling them by the bolometer, they finally come into contact with the clouds."

The scientist paused and squinted at the reproduction screen. It was blank.

"Watch the screen, gentlemen," he continued, turning again to the instrument. "I'm going to increase the power of the beam until it discloses objects on the other side of the cloud, I am broadening the beam so that at its tip describes an area of more than a score of miles. Objects within the range of the circle will now come on the screen."

He turned again to the screen on the wall.

"Ah . . . , gentlemen," he said. "You see before you a number of aircraft and birds that are not visible to the eye from here. The objects are behind that cloud bank, my friends!"

Across the screen sped craft and birds that were completely hidden from view behind the seething black bank of clouds far to the east. They scudded through the heavens rapidly and gradually passed off the square of glowing material that formed the outward surface of the screen. The scientist increased the radius of the circle and the objects appeared again to gradually vanish into invisibility as they scudded in various directions out of the beam.

Captain Wollack watched the screen with rising hopes. Here at last, he thought, was a means for detecting the invisible raiders! It seemed a fantastic theme, but nevertheless he felt convinced that the scientist's *Radio Eye* could be successfully utilized for the apprehension of the criminals.

Presently Colonel Brigham walked to the window to scan the heavens. Nowhere within his range of vision could be seen a single craft. Space between his position and the cloud bank seemed strangely vacant of aircraft which at that time of day should have fairly dotted the sky. He bent close to the instrument to study it.

"Look out, Colonel!" the professor shouted a warning

The executive jerked back with a grunt, clapping both hands to his face. A faint odor of scorched hair permeated the office. Simultaneously the captain and the scientist leaped to his side, but Colonel Brigham removed his hands from his face and grinned behind a set of scorched chin whiskers.

"Why the devil didn't you tell me that thing was hot."

"But I guess I overlooked telling you that those infra-red rays contain a terrific heat at short distances. Had you come into closer contact with the ray it might have injured your complexion seriously."

"What's a few grizzly whiskers among friends, Colonel?" Captain Wollack laughed after seeing that his chief had suffered nothing more than a scorched hirsute adornment. "You needed a trim anyhow."

The colonel grinned sheepishly.

"Your *Radio Eye* is quite an achievement, Standish," he said, warmly "and it has wonderful possibilities. Do you think we could use it with any degree of success on those raiders?"

Professor Standish regarded the executive's face for an instant before speaking. The captain watched the scientist eagerly.

"I have utmost faith in the ability of the *Radio Eye* to neutralize invisibility at whatever length we permit the beam to be released," the professor said seriously.

The Professor's Theory

"PERHAPS," Captain Wollack interjected, "you have an idea how those raiders make themselves and their ships invisible and silent?"

"I have, Captain," Professor Standish replied, "but let me acquaint you with the manner in which I believe the raiders came into possession of the invisibility secret. It is my opinion that they are the gang of adventurers who stole a formula for rendering things invisible, from a brilliant Oriental scientist who little more than a year ago reported to the scientific world his success in evolving such a formula. Shortly after his announcement he reported that the document had been stolen from his Shan Tung laboratory. The theft was later traced to a band of scientific thieves, but not before they departed from the Orient taking the formula with them. Then they dropped from sight entirely and all efforts of the Oriental scientist to locate them failed. So I'm inclined to believe that your invisible raiders form the gang that stole that document."

"That's astounding, Standish!" ejaculated Colonel Brigham.

"A perfect clue, Colonel!" Captain Wollack said with enthusiasm. "Our secret service man might have trailed those crooks had they known about the theft of the formula."

"Probably, Captain," the scientist replied, "but the brains of the Oriental police were not quite so cunning as those of the gang's leader for the crooks vanished entirely. The scientist spent large sums of money to regain the document. When my nephew informed me of the strange invisibility of the raiders I concluded at once that they possessed the stolen formula and had deciphered it for their own ruthless ends."

"Then you understand the principle of that formula, Standish?" the colonel inquired, eagerly.

"Not altogether," the professor stated. "Science has been struggling to learn the secret of invisibility for years, Colonel, and while it has come very close to success, the Oriental is the only man to my knowledge who has actually succeeded in achieving that phenomenon. Every physicist is aware that the infra-red offers

the lowest vibrations of light which the human visual organs are able to perceive as I have said. That is the extremely deep shade of red which vibrates at the almost inconceivable rate of 400 trillions per second. Below that the retina is unable to distinguish objects or motion of any kind. In my opinion the Oriental succeeded in reducing the vibrations of the infra-red below the lowest frequencies of radiation to which the human eye is adapted thus rendering the retina incapable of perceiving objects in contact with such vibration. In order to create the lower vibrations he must have found even a deeper shade of red in the infra-red spectrum than the deepest hitherto known. This shade of red was probably reproduced in some sort of a material chemical which the scientist subjected to high frequency energy to cause a vibration within it. Results were that a sort of a lacquer involving the infra-red principle was created. How it was actually performed, we do not know, but objects applied with the hypothetical chemical charged with high frequency oscillation were rendered invisible. I hope, gentlemen, that the explanation will lighten your minds as to how the pirates managed to achieve invisibility."

"Quite astonishing Professor," Captain Wollack said. "But didn't you say that at the end of your infra-red beam projected from the *Radio Eye* existed the lowest vibrations of lights which the eye is capable of perceiving? How then can your instrument visualize objects in vibration so far below them as the oscillations of the Oriental's chemical? Will your instrument actually neutralize the invisibility of those raiders?"

"When the *Radio Eye* was put in operation, Captain," the scientist replied, "you probably heard the audible hum of its mechanism. Within the bell of the instrument is one of the most delicate of high speed rotary motors in the entire world. This bit of mechanism was embodied in the instrument to control the vibrations of the beams sent forth from it. With it I can adjust the vibrations of the ray to any frequency desired with the same results as if it were oscillating at the same rate as it did when I neutralized that cloud bank. By making certain adjustments on a dial controlling the instrument's interior mechanism objects even farther below the scale reached by the Oriental can be forced into visibility. No adjustments are required, however, for the transformation of the infra-red beams into regular light rays which reproduce the invisible objects on the screen. I am confident, in fact, I am positively certain, that my ray will neutralize the invisibility of the raiders, my friends, through the same medium that I have neutralized the bank of clouds and the tiny atom. As for the silence of those raiding ships, the explanation requires little thought. They are doubtlessly using rubberized screws which deadens friction to a degree of making them inaudible."

"Someone in that gang must have a tremendous knowledge of science, Standish," Colonel Brigham said, bluntly. "It's a certainty that they did not seek the aid of some recognized scientific authority to work out that invisibility formula."

"Correct, Colonel!" the professor replied. "One of those pirates, probably the leader, is the smart one. They could not have approached anyone else for fear of losing the formula and their identity as well."

"It's a wonder that they did not go in for bigger game than raiding the airlanes," Captain Wollack interjected.

Professor Standish nodded.

"Their raids at present are probably for experimentation more than anything else, Captain," he said. "They are doubtlessly planning the eventual sacking of the United States Treasury. But before they go to that extreme they must want to determine the safety of their present operations.

"Quite so, Standish!" the colonel grunted.

Another Raid

WITHIN a month after the demonstration of Professor Standish's *Radio Eye* in Colonel Brigham's office, five larger and more powerful instruments were erected secretly under round-topped structures that appeared to be small astronomical observatories with sliding domes. Stations were constructed in Los Angeles, Denver, Chicago, Pittsburgh and New York. Each was equipped with projecting screens and the additional facilities for television broadcasting of whatever images the *Radio Eye* produced upon them. Secret low wave assignments were given to each station to prevent public reception. Should the raiders appear over Los Angeles, their direction, position, strength and formation would at once be broadcast ahead to the other stations.

Thus equipped, the Federal Aero-Police would be forearmed with information long before the raiders swooped down like preying birds upon the unsuspecting air leviathans.

Few outside of Colonel Brigham and Professor Standish understood the operation of the instruments. During the course of the erection of the stations, the scientist selected five trustworthy members of the Mid-West division and schooled them in operating the machines. Fifty other men including Captain Wollack underwent a brief schooling period to acquaint them with the operation of miniature *Radio Eyes* that had been installed in the fuselages of a half hundred Federal ships forming the captain's select squadron. It was this squadron which in time was to attempt the total annihilation of the daring band of invisible raiders.

During the time that the stations were being erected and the miniature instruments were being installed in the fifty aero-police ships, air liners flying direct routes from coast to coast underwent a rapid series of raids. The suddenness of the depredations worried Colonel Brigham considerably. He had a vague feeling that the raiders were aware of the latest developments in behalf of the law to apprehend them. They would therefore take advantage of their temporary security, and then vanish. Several Washington newspapers were fully aware of Professor Standish's plans for "spotting" the invisible raiders, yet they continued to upbraid the Colonel for his apparent inability to apprehend them, thus aiding the Aero-Police by flagrantly denouncing its chief and keeping secret the installation of the *Radio Eyes*.

After the series of raids, the big airliners went unmolested until Colonel Brigham began to fret and curse. Surely, he thought, crooks wise enough to execute the invisibility formula with such ease, were smart enough to have spies in circulation to tip them off to the activities of the Aero-Police. But Colonel Brigham gave the raiders credit for more concrete intellect than was actually due them for suddenly he received a report in his Washington headquarters that twenty invisible and infinitely fast ships were flying in formation over Denver, headed toward Chicago. The report stated that the craft, void of any identifying marks, had been spotted by the Denver station and the image relayed instantly to Chicago over which city the ships, in all

' kelihood, would pass at a moment determined by their terrific velocity.

Colonel Brigham sat at his desk and nervously fingered the message. Suddenly he sat up with a jolt as though realizing the importance of the document for the first time. With a bound that would have done justice to a much younger man, he leaped from his chair and strode swiftly across the office to a compact television broadcast receiver that Professor Standish had installed in the room before he announced that his work was done. The executive swung open a hinged door and pressed a button switch on the face of the instrument. He adjusted a single dial control. A small screen inserted at a convenient angle in the set, flashed as forms were definitely shaping themselves upon it. Instantly he beheld the interior of Captain Wollack's private office in Chicago.

He pressed a button and heard the buzz of the call signal bringing attention to the television in the Chicago headquarters. A tall, lank young man rose from a chair in the far corner of the office to answer the call.

"Captain Wollack's orderly speaking." Colonel Brigham heard him say. He stared at the freckled face on the screen.

"Where in hell is Captain Wollack?" the executive shouted impatiently.

The orderly stared at the features of Colonel Brigham for several seconds before replying. Then he recognized the bear-like visage of the official.

"Don't stand there like a gawk! Where's Captain Wollack," roared the Colonel.

"I did not recognize you, sir," the orderly said nervously. "Captain Wollack has already gone aloft, sir, at the head of the flight. The raiders are due over Chicago in four minutes, sir, and are reported flying over the Continental air-freighter *Jupiter* for a raid. Any message for Captain Wollack, sir? I'll relay it to him in the air, sir."

"Tell him to call me when he lands!" Colonel Brigham roared. He swung the dial around and the features of the orderly vanished from the screen. It glowed again in contact with the Chicago station's projecting room.

An operator sitting at a switchboard accepted the Colonel's call.

"This is Brigham speaking," the Colonel said tensely. "Hook me up with the screen at once! I want to watch developments. Keep your instruments on the raiders until I sign off!"

"Yes sir!" replied the operator. "At once, sir!"

What Colonel Brigham saw on the screen of his private television instrument caused his blood to leap. In formation, swiftly approaching the huge air-freighter *Jupiter* with its valuable cargo of ingot gold, silver and platinum shipped east from the western mining regions, were twenty small triple-motored ships of the fast pursuit type. With twin screws spinning at high velocity, they swung downward gradually. Like sparrows attacking an eagle, the ships, which would have been invisible to the naked eye, hovered for an instant over the broad aerofoils of the unsuspecting freighter. Suddenly as one, a number of them settled on the *Jupiter's* expansive wings!

The executive groaned when he beheld heavily clad figures clambering out of the planes. At the tremendous speed that the *Jupiter* was turning up under the thrust of her twenty-four screws whirling on the shafts of twelve powerful motors, one would think that it were impossible for an object to remain long on her streamlined aerofoil surfaces without being hurled into space. But at the great altitude in which she was flying, the rarefied air did not to any perceptible degree hinder the sky raiders from landing their craft on the *Jupiter's* broad wings. Nor did the rush of air prevent the raiders themselves from walking without much difficulty across the expanse to the hand railing which formed a safe companionway on her surface. It was at the rail that the pirates congregated to hold council. Colonel Brigham observed that they left the motors of their planes idling and in the cockpits sat pilots ready to take off when the raid had been accomplished, while above them circled their companions.

The executive studied the sky with growing nervousness. Nowhere within the range of his television screen could be seen Captain Wollack's flight. He roared like an angry bull and rose from his seat at the receiver to stamp heavily around the office. When he made the circuit he sat down again. Far over to the left of the *Jupiter* hovered a mass of deep gray clouds. Had he known what they were, the colonel would have been astounded beyond comparison, for at an elevation of six miles floated the ever-present noctiluminous clouds! Had he been able to see behind them he would have conceded then and there that Captain Wollack was stopping at nothing to apprehend the raiders who were now at work on the great freight-carrying leviathan of the upper reaches.

He had ordered the Chicago station to keep its instruments on the raiders. On them it was—its infrared beams transforming the invisible to visible! And had the executive known that his operatives were waiting a favorable opportunity to swoop down on the pirates from behind the cloud screen which hid their craft, he would have at once ordered the Chicago station to switch its penetrating rays into their midst.

The Battle in the Sky

IGNORANT as he was of the position of Captain Wollack's flight, Colonel Brigham had ample reason to fume and swear at the delay of the police craft to clip the wings of the raiders. The pirates had vanished from the *Jupiter's* aerofoils. They had forced open a companionway hatch on the top of the huge ship's body, and disappeared within. The *Jupiter* continued straight ahead like a frightened hawk in terrified flight while the raiders ravaged her storerooms of the precious metals which Colonel Brigham knew she carried.

At her tremendous velocity the *Jupiter* was rapidly nearing the high floating bank of clouds and would presently skim through the atmosphere beneath them.

Almost at the point of distraction at the apparent failure of Captain Wollack's flight to put in its appearance, Colonel Brigham fairly leaped away from the television at the sound of treading footsteps behind him. He calmed when he beheld the smiling features of Professor Standish

"What's wrong, Colonel?" the scientist asked. "You look ill."

"I've reason to be, Standish," he shouted savagely. "Look at that screen! The dirty thieves are at work on the *Jupiter* and there's not a single Federal craft in sight! Isn't that enough to make a man ill?"

"Oh, they'll show up in plenty of time, sir," Professor Standish soothed. "Just watch the screen."

The scientist pulled up a chair and sat down before the television screen. The police executive slumped heavily into his chair at the instrument, burying his

shaggy chin in trembling hands. For long seconds they watched the plundering of the great air liner. The Colonel cursed with renewed vigor when the raiders appeared again on the surface of the *Jupiter's* aerofoils, each weighted down with burdens.

As rapidly as they could, the pirates made for their respective planes. Apparently by signal they took off with startling suddenness.

To the Colonel it appeared that the *Jupiter* merely slid herself from under the raiding ships. They zoomed upward in a half loop, righted and shot like comets toward the rear of the air freighter.

When the raiders abandoned her, the *Jupiter* was well under the cloud bank. As she scudded eastward, free from the scourge which had clung to her wings, there came from behind the noctiluminous bank, half a hundred blood red pursuit planes—Captain Wollack's own private squadron!

Professor Standish shouted as they shot from behind the cloud and raced at a terrific velocity in the direction taken by the raiders.

"They're after them, Colonel!" the scientist yelled, tipping his chair backword. It clattered loudly on the floor. He danced gleefully.

"My God, at last!" the executive boomed.

Tensely they watched the pursuit, the red ships of the Federal Aero-Police gaining rapidly on the scudding, gray craft flying in even formation ahead of them. As if by signal, Captain Wollack's flight swung out in a crescent, to completely surround the fleeting craft.

Like a great flock of helldivers flying in half circle formation low over an ocean, the red ships hurtled through the depthless heavens with the velocity of rockets, their triple-screwed motors thrusting them forward to gradually close the space between the two flights.

"The *Radio eyes* in the Federal craft are functioning perfectly, Colonel!" yelled the scientist happily. "Your men are hot on the tails of the raiders! There's nothing invisible when the infra-red rays neutralize invisibility! Watch them!"

Suddenly the fleeting craft zoomed upward as though the whole flight was automatically controlled, and reversed their direction. Hot after them went Captain Wollack's ships, with long streaks of vivid blue flame shooting into the flight ahead. Each of Captain Wollack's ships were belching high explosives from the Atherton machine guns with which each was equipped. On the screen, four solid jets of flame could be seen shooting ahead of each Federal ship like pencil-thin rays of blue fire. The Atherton machine guns, which poured forth from their muzzles compact missiles of high-powered explosives rather than leaden or steel-jacketed slugs, had begun to tell on the fleeing raiders.

Three gray ships suddenly heeled to the windward and flopped earthward like birds struck with fire. Jets of red flame shot backward from the scudding pirate craft. Presently a blood-red ship dropped out of the formation in pursuit and hurtled earthward out of control. To retaliate the Red Squadron sent a savage barrage of explosives into the raiders with such deadly precision that the entire formation suddenly broke with six more of their number tumbling like plummets to the earth miles below!

Apparently bent on the total destruction of the well-organized ring of air pirates, Captain Wollack's formation broke in pairs and shot after the gray craft with an ominous deadliness.

For a half hour Colonel Brigham and Professor Standish watched the raging battle of the upper reaches, tense and strained to the utmost. Perspiration formed great beads on the scientist's broad forehead. Colonel Brigham chewed with bulldog tenacity at a charred and frayed cigar. His hands trembled with the thrill and excitement of the fight.

The battle raged over the earth for several hundred miles in either direction. Yet the television screen disclosed the entire range. Here and there, like dots in a fathomless sky, gray and red ships could be seen whirling through the terrific maneuvers of persistent dog fighting. Frequently a gray ship shot into the higher altitudes above the noctiluminous bank and as frequently a gray craft plunged earthward through it.

Presently but one single gray raider remained in the heavens. Like a deserted eagle it barrel-rolled, zoomed and flopped in a sign of utter defeat. Quickly the victorious remainder of the Federal Aero-Police ships circles the gray craft like a hen mothering a lone chick. They dropped earthward at a terrific velocity, the lone gray chick content to remain under the bristling wings of a militant mother.

Colonel Brigham and Professor Standish sat for what seemed a long, long time, relaxed and limp. A half-burned cigar hung rakishly from the parched, dry lips of the executive. The scientist, lacking strength from the strain of excitement, sat very still, eyes resting behind closed lids. The television screen had been dead for several moments. The executive had shut off the current when the circle of red ships with its lone, gray captive totally subdued, skimmed across the sky out of range of the Chicago station's infra-red beams.

Suddenly they were awakened from their abstraction by the calling buzz of the television. The Colonel sat bolt upright and reached out to press the control button. The scientist leaned forward as the executive swung the dial on Captain Wollack's wave length.

"Well, Colonel," Captain Wollack's voice came through the coils. His haggered features were stamped distinctly on the screen. "We've won! The raiders have been wiped out with the exception of one man—the ring leader, who surrendered rather than go down in flames. He is in confinement under irons here. Can you come over to question him"

"Well done, Captain!" Colonel Brigham said, softly. "How many men did you lose?"

"Fourteen, sir!" he replied with reverence in his voice.

Professor Standish paled and leaned forward.

"Jack Standish, Captain?" he asked tensely.

"No, Professor," Captain Wollack returned. "Your nephew came through the thick of it without a scratch, though his ship was riddled. He was flying second in line and he never wavered. He's a remarkable flyer, sir, and a real fighter!"

The captain addressed his superior.

"When you get here, Colonel," he said with a grin, "I want to give you something."

Colonel Brigham regarded the face on the screen curiously.

"What is it, Wollack?" he asked.

"The invisibility formula, of course!" Captain Wollack stated. "We captured the leader of those invisible raiders and he gave it to me a few moments ago for presentation to the government in exchange for leniency. He's really a brilliant man, Colonel, and a brave one. He confessed to stealing the document from an Oriental scientist and from what he told me

(*Concluded on page* 366)

The Robot Master

by O. Beckwith

"Here is the robot control board These hundreds of circles register all things that pass before the eye in my robots. For every circle here there is a robot."

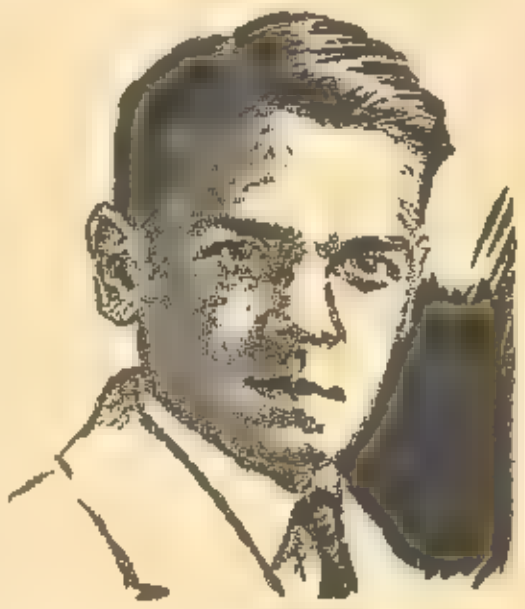
THE ROBOT MASTER

NEW YORK in 1965—"a sight to dream of, not to tell." Mighty buildings that pyramided up, level by level, into the dome of blue above. Bridges that spanned their white lengths aver the green of water below them. Great factories, smokeless, clean, beautiful. And everywhere—people. Walking, riding, flying, they went about their accustomed life, whether in the offices, factories, or on the bridges. A wonderful city! It was the culmination of all that man had learned since he began to walk erect.

And even more—New York was a silent city. Turbines, engines, generators, all were silent with a peaceful and delightful silence. There was no more of that ceaseless roar that had characterized the city forty years ago. It was a city for meditation, for work, for play, for love; but never for crime or idleness. There man began his search for higher knowledge, his endeavor to live life beautifully. Truly it was a city of dreams come true.

But even though it was a city of silence, it was one of movement. Motors shot to and fro on the different street levels, and there were subways below the ground and air expresses above it. Beginning with the tops of the highest buildings and extending five thousand meters above them were the airplane levels, the lowest for freight and other slow moving vehicles, the rest for passenger and pleasure driving. Planes rose ceaselessly or dropped from one level to another, or perhaps swung down to the nearer landing stages. There was unending movement, but movement ably directed, synchronized, and harmonious.

Above and seemingly aloof from all this concentration of energy a tiny black speck hung in the air, scarcely visible from the city below. It was a tiny helicopter, painted with the vivid g r e e n that marks all the Traffic-Director ships. It seems rank foolishness to station a Director ship so high, on the five thousand meter level in fact, but it is there for a very definite purpose. The five thousand meter level is the most exclusive of all air l e v e l s. Only two varieties of ships may proceed on it; the mail or governmental ships and those, that for a sufficient reason, have acquired a permit from the American Council. Consequently it is a very lonely level, offering excellent opportunities for anyone to try out the speed of his new plane. This in itself is a dangerous proceeding, both to the speeder and the mail plane. As mail planes have an average speed of about 700 miles an hour, they can give no warning to other machines in their path; and the speeder is likely to relax his vigilance for one second, and, upon looking up, to see a mail plane bearing down upon him. Therefore the Director ship. It sees that only permit planes enter the sacred level.



O. BECKWITH

The sole occupant of the plane was a lithe, well-built, dark-haired youth, who acted as if his important position did not weigh heavily on his mind. He was yawning and stretching, not even keeping up a lookout, for experience had taught him that few persons cared to make th- climb at one o'clock in the afternoon. He broke from his lethargy a moment to wave a greeting to the mail plane that hovered for a second near his position until its radio message: "clear the way," had taken effect on the traffic below. Then the plane shot downward, bullet-like, to lose itself in the maze of the Central Station landing stage. The youth curled himself up on his cushioned seat again.

A radio-activated buzzer sounded beside him. He sprang to the other side of his plane, and peered through the glass that lined its cabin. Five planes, flying swiftly, were approaching him on his own level from the east.

The youth pressed a button. From the top of his plane a green flare shot into the air. It swung slowly back and forth, back and forth, blocking the further passage of any ship on the five thousand meter level. The five planes jarred to a halt, not a kilometer from the Director guard. The youth spoke into a microphone near his mouth. From a little amplifier at the end of his left wing a voice sounded, not loud but singularly penetrating.

"Show your permit, please," it said in a bored, efficient tone. There was no movement from any of the other planes.

Then the answer came back in a calm but metallic voice, "Are you the Director?"

"Y e s !" the youth called back, "Where are your permits?"

"I must speak to you at once," the v o i c e called. "Something terrible's happened."

"O h , alright," the youth shrugged. "Come on." He released the ray to allow the planes to proceed. No thought of banditry entered his mind. At that time education had taught the world that crime did not, and never could, pay. Criminals were few and far between, even in the isolated sections of the country.

The planes moved for-

HOW far is it possible to actually build machines that can successfully simulate a man in practically all his capabilities? Is it true that anything that man can do a machine can do better?

Of course, it will not be possible to evolve a robot, that is, a mechanical man, who can think for himself. Yet, it is possible to produce such a man to go through any imaginable motion that an actual human being can perform.

As a matter of fact, such robots, controlled by radio, have already been demonstrated and were made to perform various functions. The well-known TELEVOX, perfected by the Westinghouse Electric Corp., is an example of what such machines can actually accomplish. Moreover, such a robot is far superior in many instances than humans, because the robot is deprived of the possibilities of human error. He makes no mistakes, because he does not think; he cannot forget, and as a rule he functions 100 per cent. efficient.

In the present story, the author has used this theme in a novel manner to create an adventure of the highest order.

ward, slanting upward until the landing gear of one was barely five meters above the Director plane. The door in its side opened. The youth threw open the cabin-roof porthole on his own ship, and thrust his head and shoulders out into the cold air.

"Hurry up!" he cried, "It's cold—"

He never finished the sentence. Events began to happen before he could withdraw into the comparative safety of his cabin. Two shining, metal-clad figures leaped out of the open doorway and onto the top of the Director ship. One of them struck the youth a terrific blow on his helmeted head, the other vanished inside the plane and quickly disconnected the wiring of the green ray.

When he reappeared a moment later, his companion had already lifted the limp and unconscious young man into the ship above them. The second attacker leaped stiffly after the first, the door closed, and once again they took up their flight.

Sudden Death

THREE kilometers further travel took the five ships directly over the heart of New York. They were descending swiftly. A thousand meters below them were the Lord, Inc., the Treasury Building, and the Kines and the Lonor, two of the magnificent office buildings of the city. Only a short distance to either side were the two largest factories in the world. It was a strategic position, whether for attack or defense.

Suddenly metal, torpedo-like projectiles dropped from beneath the cabins of the five ships. One after another they shot down toward the city below, while the planes circled slowly, about the area set for the attack. The first torpedo struck. There was a tremendous explosion and great masses of the buildings were tossed aside as if by the hands of a giant. Crash! Crash! CRASH! Skyscrapers tilted, swung back and forth with a horrible rhythm, and collapsed in the streets. The carnage was impossible to describe. Building after building spouted steel and plaster as those projectiles rained down upon them. The second Brooklyn Bridge, with one hundred thousand people crossing and living upon it, was struck by four missiles and blown completely out of the water. Airplanes were caught by the uprush of the ruins and were torn and ripped into myriads of tiny pieces. Everywhere was destruction, complete and absolute. Those that were not annihilated by the storm of wreckage were smothered by the dense masses of gas that were released by part of the projectiles. Three million people found graves in those ten minutes that death poured down from the skies. Buffalo, Ontario, Philadelphia, and hundreds of smaller cities near the coast were deprived of light and heat. In ten minutes the five ships had demoralized the eastern seaboard capital of the American Republic. But then, as if indifferent to the chaos they had wrought, they turned again toward the Atlantic Ocean and disappeared over the horizon.

It Becomes Clear

THE youth's first sensation was of a glaring light that hurt his eyes. He blinked and sighed. Then, as from a distance, he heard a voice, "he's awake," and then a door slammed sharply. The youth rolled over and sat up, repressing a groan as a throb of pain shot through his head. He wrinkled his brows and stared around him, vainly trying to place his surroundings in his memory. The room that he occupied was a small one, windowless, and lighted only by a detachable bulb that rested on the table near his bed. There was no other furniture, but a pile of newspapers shared the table with the bulb.

The boy idly picked up the first of the papers on the pile. It consisted of only a single page, and was dated October 1, 1937. Near the lower left-hand corner he saw a paragraph that was outlined by a circle of red. He bent closer to read it.

At the top of the paragraph was a picture, so faded and yellow that it was nearly impossible to make it out. The youth dismissed it with a casual glance and turned to the body of the reading.

"New York City, Oct. 1—Highest honors were awarded to H. L. Benning for his advancement of the mechanical robot by the use of central control. Prof. Benning, using radio beams, was able to control a group of robots from a distance of fifty miles. Although a great many experiments have been made in controlling robots from a distance, Prof. Benning's stands out in that he was able to issue different directions to the entire five simultaneously, which heretofore has been declared impossible. Professor Benning was able to accomplish this remarkable feat by communicating with the leader of the five, who transmitted his different orders to the other four. The group of "mechanical men" walked back and forth, turned switches off and on, lifted heavy weights, leaped off the ground, and did other seemingly impossible feats.

"Prof. Benning, in an interview, gave it as his opinion that his improvements were only the beginning of the use of central control robots. In a few years, he said, he intended to so improve his group that they could be directed from any distance, and further that he would make them perform anything that a human could do.

"An illustration of Professor Benning's robots appears above."

The effect of the paragraph on the youth was indescribable. He caught up the light bulb and pressed it closely to the dim picture. With its aid he was able to make out a form, vaguely human, with arms, legs, and trunk. But in place of a human head there was a tiny round knob, with a solid black hole in the center.

"God," he whispered. "I remember now. Two of them . . . jumping on my plane . . . hitting me. And Benning . . . my father's brother . . . my uncle! What can he want of me?"

He caught up the next sheet. It was dated 1950, and was identical with the first except to the outlined paragraph. This one was very brief and to the point.

"Quebec, Jan. 17.—At the annual discussion of the World Council of Seven, Professor Hyle L. Benning was officially declared a world exile. This move was due to his recent strenuous activities in behalf of the Monarchical Party, which is opposed to the extension of republics and democracies throughout the earth. Prof. Benning will join the small group of other outcasts on Exile Island, in the Pacific Ocean, near New Zealand."

"I never knew of that," mused the youth. "I was only ten then. My father never told me . . . just the few words that his brother was a man under a cloud. I wonder . . . ". He caught up the next paper.

It was a copy of the *North American Bulletin*, the only newspaper issued in North America, the radio-vision news broadcaster having replaced all the others. This copy was dated Wednesday—today's paper, the youth concluded after reflection—it was Tuesday that he had last patrolled the five thousand meter level.

Great headlines streamed across the *Bulletin's* front. They flashed before his eyes, but it was some seconds before he could bring his mind to concentrate on what they said.

HEART OF NEW YORK DESTROYED
UNKNOWN ENEMY BOMBS BUSINESS SECTION

Britain, The Central European Republic, and all other Republics deny Responsibility.
Ancient War Weapons being rapidly prepared for action.

Who is the Unknown Enemy? This question is being pondered in million of minds today, as the details in the great New York disaster are being given to the world. Outside of the horror of the event there is but one conclusion to be drawn, namely, that some power is endeavoring to establish itself as ruler over the North American Republic, and perhaps over the whole Earth.

Here is the bare thread: The observer in the Grantland Astronomical Building, being off duty at the time, was watching the air traffic with a small telescope, when he noticed five ships rapidly approaching New York from the east on the five thousand meter level. As this in itself is an unusual proceeding, he kept his telescope on them during the whole of their flight. He saw that they were challenged by the patrol, and that one of them came forward, as if by invitation. When the ship was immediately over the Traffic Director, two men leaped out, and subdued the Patrolman on duty. This act was followed by the slow unchecked advance of the ships, over the city, their descent unchallenged, and the dropping of the bombs. The destruction was terrific, so great that mere words are useless to describe it. The bombs were composed of some new and very powerful explosive, the exact nature of which has not yet been ascertained by the Explosive Bureau. Their effect was the complete demolition of all buildings within a ten kilometer radius of the Kines Building. More than three million people were killed. From. . .

Arnld's Choice

THE boy read no further. Sick with the horror of it all, he buried his head in his hands, and lay face downward on the cot. He saw it all . . . everything. His uncle—"a man of deathless anger"—his father had called him. And that anger turned against the very world that had exiled him! A world that knew nothing of war; a world that was peaceful because the men that made it up had grown up as peace-lovers. Against that—one man, but with endless power. The Robot Master! With not the slightest danger to himself, his uncle could send an army against the world—an army that would obey his commands perfectly, an army in which there was no danger of revolt, an army that was invincible!

Another thought intruded itself into his mind. What did his uncle have in mind for him? Was there still another message on the table? He felt over the table. His fingers came into contact with a stiff envelope.

It was long, sealed, and addressed to 'Arnld Benning, Officer Traffic Direction Corps, retired;' and the word 'retired' was underlined with red ink.

He quickly tore it open. Inside were three sheets of notepaper, closely typewritten, and addressed to the same Arnld Benning.

"My name," thought the youth, "I was only ten—he couldn't have known—perhaps he's had spies all this time." He turned to the letter.

"My dear Arnld (it began). You have of course read the newspapers, and consequently are enlightened as to my purpose. I write this letter only as a matter of my own safety. I have no doubt that you would do your best to kill me if I so much as entered your presence. I am, of course, your own flesh and blood, but your world is a great deal more dear to you than I am. Puzzling, but true. Devotion to any world, however large or small, seems to be a quality that was omitted from my makeup. Whether it is a loss or a gain, you may judge for yourself.

"Be that as it may, I have determined, my dear Arnld, to take a very generous revenge against your world. It has aroused my anger, which is an everlasting thing and very deadly. It has taken fifteen years, long years they were, but the world is at last reaping the death that it has sown. I have two purposes, one; to completely humble every nation on the earth, and second: to establish myself as ruler over those nations. A great endeavor, is it not, my dear Arnld?

"Perhaps you doubt me? What happened to New York is only a foretaste of what will happen to London, Peking, Sydney, Paris, Berlin. And after them, others. I have no pity, nor shall I have pity. My power is endless, unconquerable. Mankind shall not escape. But pardon me. I see that I wander.

"Arnld, it is to you that I offer these things, these cities, these nations, this world. I can not live forever; no man can. There must be one after me, and I have chosen you. Why, I hardly know myself. There is good blood in you, boy, my blood, and I have no doubts that you can fill my place. The question is; do you want it? If so, very well. If not—it is regrettable, but you must die. And believe me, my dear Arnld, I would have no compunction over killing you. You are a cog in my machine, and if you are a misfit, it will be easy to find others that are not.

"I will at least be fair with you. It would be indeed a cruel act to put you into charge of a kingdom that did not exist, and that could not ever exist. If you knock heavily on the door, you will be released—from your room. You will be directed to me. I will show you my devices, my inventions, and you may decide whether the risk of joining me is worth the danger sustained. That question is the only thing on which you need to ponder. You will find that loyalty to a world will swiftly vanish in the presence of a particularly cruel death.

"I await you, and afterwards your decision, with confidence. Remember, 'A sensible man will take dishonor before death, for life is very precious.'

"Until we meet, Arnld, I remain

Hyle Benning."

Arnld raised his clenched fist and shook it in the air. "Damn you, Hyle Benning, if you can hear me!" he cried. "My honor is worth more than my life! Can't you hear me, you hell hound!"

There was no answer. Only the sound of his voice, resounding on the steel walls of his cell, gave forth a faint chuckling echo.

Benning's Power

"I TRUST your head is recovering." The words made Arnld swing around. He saw a little bent old man entering his cell. Vaguely Arnld connected the man with his uncle.

"It is—but not because of any aid of yours!" snapped Arnld. "Come—don't play the hypocrite. Kill me—for I tell you here and now that I will have nothing to do with your devilish plan!"

"My dear boy!" Benning smiled at him. "Of course I don't intend to kill you—at least not yet. You've seen nothing of my instruments. I want you to see them—I take pride in them. They're mine, right out of my own brain, most of them. I have one now—would you wonder what I would do if you suddenly leaped at my throat?"

"I wonder," said Arnld quietly. He had been planning that very thing for some moments.

"This!" Benning pressed a button on the side of his chair. Instantly from the wall at Arnld's back a curved blade sprang. It swung out and around, hissing through the air as it went. Suddenly it stopped and withdrew into the wall again. It was easy to see what would have happened if the blade had not been arrested in its course. Arnld's head would have been neatly sliced from his head before he could have made a move to escape.

"A clever little device," said Benning ironically. "But do not think that it was prepared for you alone. I have talked with others, some of whom it was not necessary to use it upon. Some—though . . ."

"You killed them!" cried Arnld, horror-stricken.

"Of course. My dear boy, I would as soon kill the whole Council of Seven as I would crush a gnat. Lives—Bah!—they are nothing. But" he changed the subject abruptly, "I did not bring you here to elaborate on methods of death-dealing. Go ahead of me, please. We will take a trip through my laboratory and engine room."

They went out into the hall. Benning directed a turn to the right, and they trudged in silence for a moment.

"Would you mind," asked Arnld, catching a glimpse of blue water through an opened window, "telling me where I am?"

"Not at all. You are on Artificial Island No. 24."

Arnld mentally calculated for a second. Then—"But there is no 24," he said, "There are only twenty-two artificial islands."

"You are wrong," said the professor. "There are Islands No. 23 and 24 both. I own them."

"But they are not charted."

"Do you not think," he questioned, "that if I had power enough to build them, that I would also have power enough to keep them off the chart?"

Arnld said no more. It was Benning who finally broke the silence, to tell him that the next door led into the switch-room. He opened it with an impression of impending awe, nor was he disappointed in the contents of the room. Great switchboards ran from ceiling to floor, criss-crossed with dials, fuses, wires, switches, and various other instruments, which to Arnld, who was not an electrician, were entirely unfamiliar. A great dynamo purred softly in one corner, and wires ran here and there, in every direction, to disappear into the white walls of the room, or into huge sockets and tubing. It was truly the throne room of the Great God Electricity.

"Look here," said the professor. He was leading the way to a massive board on the right side of the room. "Here is the robot control board. Do you see these many hundreds of tiny, mirror-like circles? On those register all the things that pass before the eye in my robots. It is done by the use of an advanced form of television broadcaster. For every circle here, there is a robot, and you can see the intense concentration of energy necessary to control all of them at the same time. I have never done it yet, but the time is not far off when I shall."

"And what is the purpose of this map?" queried Arnld, pointing to a flat built-in map that was integral with a desk that projected from the bottom of the switch-board.

"That?—It's a control map. You can see those many white lines branching out from a dot in the center? That dot is our two islands, perhaps I should say my two islands. Watch." Benning pressed a button and bent over the map. "Can you see these little buttons that travel on the white lines? They control the flight of my planes. When the planes are in flight, a gyroscope stabilizer keeps them on the course marked out by the white lines. The buttons, at the same time, move slowly along the lines, and upon the instant that the planes reach their destination, give a sharp click. This click shuts off the forward movement of the planes, and also gives me a warning that they are ready for action. Then I pull this switch, the planes circle—the bombs drop, and presto—another city blown from the earth. It is not pretty, but it is effective.

"You have noticed where the lines lead? To all the principal cities, of course. I shall replace the map with another, containing course-lines for some of the smaller cities, if it is necessary I have no fears, however, that it will be. Once the centers of civilization are gone, there will be little resistance from the more scattered communities."

Strategy

ARNLD stopped him with a gesture. "I can hardly understand it," he faltered. "One man . . . to conquer a *whole* world. . . How can you? It seems impossible . . . fantastic."

"Nevertheless it is true," cried Benning, triumphantly. "What can the world do? You saw the newspapers . . . the unknown enemy they called me. They're drenched with peace, filled with the stupefying fumes of it. They can't fight—because they don't know how. What can they do—bring back the old war weapons? I have fighting machines ten times deadlier than they can produce in a day."

"A day? They will have months—"

"I said one day! I strike my blow tomorrow—at six o'clock tomorrow!"

Tomorrow! All Arnld's hastily laid plans went glimmering as he heard that fateful word. Six o'clock—hardly twelve hours away. What could he do? What—like a sharp knife through his consciousness came Benning's voice.

"——other things you haven't seen. Look at the big switch in the center of the board. That is, perhaps, the most important of all the controls. It is the outlet for all the power that is generated by the great dynamos and turbines in this island and on No. 23. Shut off this switch and you shut off all the strength of my robots—and I am only one man, slightly old and weak.

"Power, boy, power! Why, there is more power contained here than you will ever see again in your short life. Think of the quantity necessary to operate all my mechanisms. First there is the broadcasting station, which sends out both my commands to my robots and the power to operate them. There is a continuous stream of power—out to the robots to move their arms and legs and body; and back again when their television eyes register a picture and send it to me. And when I control all of them at the same time—then you may be sure there is power in the superlative degree."

Benning paused, and when he resumed speaking again it was in a totally different vein.

"Arnld, you have seen, and you have heard. Can you doubt now that I can conquer the world? Forget your false scruples! I want—I demand!—an answer. Which shall it be—the world—or Hyle Benning? Death—or life? Choose!"

He laid his hand on a polished lever in front of him. Unmistakably it was a threat, and as such did Arnld interpret it.

"Uncle!" he cried, holding out one hand. "Uncle Hyle!"

A smile lit up the lined face of the other. He released the lever, and held out his own hand in welcome.

"Arnld!" It was a whisper of pure joy. "I knew—stop, you fool!"

With one leap Arnld had gained the door. His shoulder crashed against it, and he staggered out into the hall as the unlatched portal gave way. Like a fear-mad rabbit he fled down the long corridor. He heard Benning shout behind him, and caught a glimpse of a door opening ahead, and to one side of him. He flashed past it, seeing as he did so, several of those familiar metal forms running stiffly toward the opening.

He ran on and on. Thoughts whirled through his mind—would this corridor never end? God! How could a man fight machines! If they caught him—but they should not. At last! The end of the corridor; and a door. Pray Heaven, it was unlocked!

He fumbled for five precious seconds before he could push the barrier far enough to one side to enable him to squeeze through. He could see, as he worked, the glimmer of the sunshine in the space beyond the door. Freedom! He was through at last. Two steps he took—and recoiled in horror. Ten meters below him were the waters of the Atlantic Ocean! He had reached the edge of the island. He was trapped!

Behind him, the first of the robots was struggling with the partially opened door. Arnld could see others crowding the passage behind the leader. Two wild glances he cast to either side, and then, with a mocking farewell gesture to the robots, leaped far out over the blue water . . .

Arnld Returns

WHEN Benning came out on the runway a few minutes later, there was no sign of any movement on the unruffled expanse of the ocean. He stood gazing downward for a moment, a ghost of a smile on his lips.

"He made his choice," he mused. "Perhaps it is better so . . ." And he turned and reentered the building, carefully closing the door behind him. The sun shone on the water. There was not a living thing in sight.

Arnld went deep in that first long dive. He gasped when he struck the water, for it was deathly cold, but he kept on, swimming down still deeper. As he began to rise, he swung to the right and kept up a steady stroke until lack of air drove him to the surface. He saw then that he was to the south of the island, and out of sight of the door from which he had come.

Swimming with one hand, he bent down and slipped off his shoes with the other. His trousers and shirt followed. When he was clad only in a pair of shorts, he straightened out and swam, as nearly as he could judge, straight east.

The sun was low in the sky when he finally turned toward the island. The tall pillars that supported it were casting long shadows when he reached them, and there was a hint of rain in the chill air. The supports were cold and rough, and Arnld clung to them with hands and arms almost freezing from his long immersion. He began to climb, now working himself up by the sheer strength of his body, and now climbing more rapidly as he reached a cross piece.

It was pitch-dark before he dragged his exhausted body over the edge of the runway. Sweat poured from every inch of his skin, and his breath came in great sobs. He was torn and lacerated from the rough pillars and his muscles ached with every move he made. He threw himself down on the runway, curled up to conserve the warmth of his body, and was asleep in a moment.

The sun awakened him. Although he was still stiff and cramped, the brief sleep had done wonders to revive his tired muscles. He felt fit, ready for anything.

Arnld leaned against the wall and planned his campaign. The first, and undoubtedly the hardest thing to do was to gain an entrance to the building. That done, he must find his way to the switch room, where Benning would direct his planes in the bombing of the cities. Once inside the room, Arnld knew that no plan, however well laid, could be relied on for direction. He must take a desperate chance that he might be able to so surprise Benning. For with all his equipment barred, he was, as he said himself, "one man, slightly old and weak."

His Beautiful World

IT with a ventilator that finally proved Arnld's only method of entering the island building. Its black opening fully five meters above him, was at

first an impossibility. Then—as he saw that no other entrances were available—he realized that the height must be scaled. Two running jumps convinced him that he could never reach the opening in that manner. He found, however, a long steel pole that had been carelessly left outside; which, after setting one end of it in the mouth of the ventilator, he shinned up in the fashion of small boys. Crouching astride the opening preparatory to jumping through, he heard for an instant a faint hum above him. Arnld strained his eyes over the edge of the building's roof, and saw overhead, a great battle plane moving across the sky.

"The west—it's going toward the west!" he gasped. "Six o'clock; and the last of the planes going to destroy my world! No time to waste—I must hurry!" He dropped through the opening into the blackness below.

Maddening walks through passages of pitch darkness—glimpses of elusive light that vanished as he approached—stumbling over unseen objects and bumping at turns he could not see—and through it all the conviction that precious time was rushing by on speeding wings; truly any lesser man might have gone mad in the intricacies of those many black and winding avenues. But Arnld pressed on. It was luck—or the blessing of God—that the one door that he opened was the one that led into the switch-room. It was uncomprehensibly lucky—but it was true. Arnld, standing blinking in the glare of many lights, knew that it was the switch-room for it was a place which once seen, would always be recognized.

Through the opening of an alcove he could see Benning, sitting before the robot switch-board. He was bending over the map with fiendish intensity, and his long bony fingers now and then moved a switch or pressed a button.

Arnld bent over and picked up a light steel bar at his feet. He moved forward on tiptoes, and his bare feet made no sound on the smooth surface of the floor. Five steps brought him directly behind the absorbed man. But at the moment he lifted the bar for the blow, Benning turned and looked into his eyes.

"Arnld!" was all he said.

"If you move, if you raise a finger . . ." Arnld's voice was as hard as the bar in his hand.

"Arnld—wait!" Benning's voice was fearful, and yet withal it had the sound of one who was conferring a gift. From the map came a series of tiny clicks. "Arnld, let me pull this switch! It controls the bombs—on all my planes. There they are—all my ships—waiting—circling—over all the cities. Can't you see, Arnld, can't you see? The world is yours, boy, the world and all it holds! Yours! Can't you feel the thrill of power, Arnld? Don't you feel it? Pleasures! Joys! Love! All that a world has is yours for the taking, Arnld, yours for the pull of a switch!"

The bar wavered in his grasp. Almost he put it down. The urge of power was in his veins, the fierce joy that comes to the conqueror. The World! His for the taking! His limp hand refused to hold the bar. Then—it seemed that he heard a voice, very full and deep . . .

"And sheweth him all the kingdoms of the world, and the glory of them; and saith unto him, All these things will I give thee, if thou will fall down and worship me.

". . . And he said, Get thee hence, Satan . . . For what is a man profited, if he shall gain the whole world, and lose his own soul?"

Arnld straightened. His chin thrust out, and he turned an icy glance to the man before him.

Benning must have read his answer in Arnld's eyes, for he turned and made one leap for the switch. Arnld struck. The bar went through hair and bone and bit deep into the brain. And Benning, with a little choked cry, threw wide his hands and collopsed on the floor at Arnld's feet. Save for one sobbing breath, he lay very still; and so, with all the weight of his sins upon him, passed the Robot Master, a man with an immortal soul but with a brain that belonged to Death.

But Arnld did not pause to look or ponder. Hardly had Benning struck the floor before Arnld had thrown wide the great power switch; thrown it wide and so battered it with his rod that it bent into curious curves and angles. It could never be closed again. The power that had made things of inanimate steel into human semblances was shut off—forever.

It was triumph; but now that he had won, the victory seemed strangely futile. All that Arnld knew or cared then was that he was very hungry and thirsty—and very sleepy. Slowly his head sank on the desk, and he slumped into the chair. As he did so, the bright colors of the little map caught his eyes. With an impulsive gesture he threw out his arms and embraced the tiny drawing.

"My world," he said, drowsily, for the cool of the desk was very soothing to his tired brain, "my—beautiful—world."

THE END.

The Invisible Raiders

(*Continued from page* 359)

about it, Professor Standish's explanation for the invisibility covered it quite well. Sharkey—that is his name, sir, also gave me the location of the gang's headquarters where most of the loot is stored. It is on an island off San Diego. What do you think of his plea for leniency?"

The grizzled executive stroked his chin speculatively. "Well-er-Wollack, that's up to the Federal courts," he said. "But I'll see what can be done about it when we turn the formula over to the Secretary of War." He winked at Professor Standish. "I think it's a fair trade, leniency for such a valuable document, don't you Standish?"

"Well worth it, Colonel," the scientist replied, "if we really needed it."

"I'm sure we will," Wollack added.

THE END.

The Air Spy

(*Continued from page* 325)

"What fool's play is this?" he cried, turning to the old man who stood quietly by. "Some one went out by way of this ladder; where is he?" The old officer looked at him unflinchingly. "I know not," he answered, and threats and persuasions alike failed to move him to say more. After a fruitless descent of the ladder, and a narrow escape from falling into the sea, Holder returned to the main cabin in no very sweet temper and with a look of grim determination on his face.

"Bring me a measuring line," he snapped, and being supplied, he proceeded to take accurate measurements of the entire vessel with a view to determining if there were any secret compartment. He could not believe Von Holst had escaped, and he hardly thought it probable he had fallen into the sea, or purposely taken his own life.

At length, he discovered a space of ten feet unaccounted for in the stern of the vessel, and his suspicions were further heightened by the fact that he fancied he heard rattling sounds on the other side of the steel partition while he was examining it.

In point of fact, Von Holst and his wife were at this moment safely on board the *Spindle,* having gone down by way of the steel ladder, the *Pegasus* having risen above the *Spindle* in order to conceal the maneuver, and the latter, being without lights, remained invisible against the black background of the ocean.

After fruitlessly trying to drill through the hard bulkhead with the tools he could find on board, Holder determined upon a new scheme. "Bring your ship around and run her prow level with the top of the *Petrel,*" he commanded, and it seemed to him the gray-haired commander smiled faintly as he turned to obey the order.

Meanwhile, the wind had risen to a gale, making the operation extremely difficult and hazardous. But Holder grimly held to his purpose.

A close search revealed a tiny manhole in the stern of the vessel and after several attempts, it was broken open, and, with drawn revolver, Holder stepped inside. It was empty; a very short survey satisfied him that it contained no hiding places, and after giving orders for the captured vessel to be secured to his own with sufficient cable to permit driving, he turned to enter the pilot house when a terrific blast of air struck both vessels, keeling them far over and snapping the cables securing them together like pack thread.

Under cover of the heavy gale, a cyclonic center had swept unnoticed upon them. In an instant all was confusion; the orders of the officers were drowned amid the clanging and crashing of the steel planes, and the shrieking of the terrific wind cutting over them.

Small time had Holder to think of the ship he had captured and lost; the *Petrel* was whirled away like a feather, her powerful engines going at top speed, and all trace of the *Pegasus* immediately lost.

The pilot on the *Petrel* was reckoned one of the best air men in the Atlantic section, but all his skill was needed to preserve his vessel from instant destruction. For a time it seemed as if his most determined efforts would not avail; his gauges fluctuated dizzily and the big vessel faced alternately every point of the compass.

Toward morning, she worked somewhat out of the center of the storm, and by evening reached Charleston, a badly-damaged vessel. Two propeller blades were gone, the two forward vanes nearly torn away, and the main plane badly twisted.

After taking stock of these items, Holder sent a telegram to the secretary of the War Department, under whose office he held his appointment.

"Overtook *Pegasus* a thousand miles out; Von Holst not found on board; lost *Pegasus* in storm; repairs to *Petrel* will be completed in two weeks."

The remnants of the wrecked *Pegasus* were found six months later off the Atlantic coast, and far away in a tiny village in the heart of the Euravian forests, the one-time secret agent, Von Holst, and his devoted wife are living their uneventful lives to a peaceful close. The threatened war was averted by the great meeting at The Hague, and peace ruled the world once more.

THE END.

The Sky Maniac

(*Continued from page* 305)

Addison followed his new-found friend to the control room and watched as he maneuvered the great vessel out from under the ice and into the air When he had plotted a great-circle course for home the commander joined Addison

"I've heard of these hacksaws, but this is the first time I have seen anyone with the patience or time to actually use one. How did you happen to have one?"

"I had been experimenting in my laboratory with my new contrivance for changing dimensional consciousness when my wife telephoned that she had lost the key to the cellar padlock. I bought a new lock and, together with some books I wished to study during the evening. I took along my hacksaw with which I intended to cut off the useless lock. I was ready and about to leave when I inadvertently stumbled into my machine and was transported into the future."

"I noticed that they were through your suitcase. They examined your books and when they found that they were of a scientific nature they destroyed them with ridiculous horror."

"But why didn't they destroy my hacksaw?"

"Fortunately for us, these enemies of science had not studied science and its history sufficient to recognize the contrivance for what it is worth."

"Why is it that these 'enemies' of science avail themselves of all the fruits of scientific investigation, as in the case of this man and his stolen ship, to add to their comforts and even to further their war against science?"

Captain Gauthier became very serious. "I shall have to concede my ignorance by changing the subject of conversation to a lighter vein. Would you like to discuss the mathematicians' concepts of the seventh dimension? Or perhaps you are interested in our latest discoveries as to what lies beyond the outer curves of space?"

THE END.

The Ark of the Covenant

(*Continued from page* 351)

been set down in his own cave, he began to give us minute instructions of all we had to do before we left him.

Milliken and I had to get the *Merlin* into trim for the return flight.

The others had to connect up every single piece of metal in the cavern with thick electric leads such as were used for taking the electricity to the ray-projectors.

We had arrived at the Plateau of the Scar close on midday, and the work he bade us do occupied us till nearly midnight.

Everything he desired was done for him, but we could not persuade him to take any nourishment. The little air of gravity that was the nearest he ever could attain to a smile now lay constantly on his placid features, and the flame that lay deep in his mild blue eyes was flickering out.

The ray-projectors from the ship stood outside his cave, so that their focus was upon the *Ark of the Covenant* and upon the greater machines in the cavern. He himself had set the dials, and the main switch to the whole electric system was unshipped and, still in circuit, was brought close to his cot within reach of his solitary hand.

The *Merlin* lay at the mouth of the cavern, ready for flight, and Seton summoned us all to the Chief's bedside.

"My course is run, gentlemen," he said in his clear, level way. "My warfare is accomplished. There remains now but to bid you farewell and to thank you for such loyalty as no man but myself has ever experienced. Take with you from him you have called the Chief—from him whom in your exceeding loyalty you have called the Master—a gratitude that his passage hence cannot diminish. Philip Bentinck-Scrope—farewell!"

He called us each by name, Devonridge first. The young marquis went over and took the white hand. With a fine instinct that must have come from something deep inherent in him, he bent over and kissed it without a word, giving us all an example. Then he walked right out of the cave.

"Jim Greensleeve—farewell!"

And so through the twelve of us, Milliken, Dan, and myself last before Seton.

"James Boon—farewell!" he said to me. "I know that you will keep your trust."

I hope my answer was in my lips when I put them to his wasted fingers. I could not speak.

"Ah, Sholto Seton!" I heard him say as I walked out of the cave. "What am I to say to you, my trusty and trusted comrade?"

What passed between the Master and the big fellow in the minutes that elapsed before the commander came out of the chamber is sacred to them both. I will only tell that Seton's arm was over his face as he stumbled through the curtain.

Together we set the turbines of the waterfall working and walked along the ledge to the *Merlin*. Milliken was on the floats in readiness and the rest of the men were aboard. The machine sped down the basin, and I turned her into a circling climb, soaring high above the Plateau of the Scar. Up and up we soared, high and higher still.

The deep blue of the sky above us was shot with a myriad stars. Far below us the land lay inky black, but for the faint sheen of the waters about the plateau.

Suddenly, far beneath us, the darkness was split by a tongue of blood-red that flashed into orange and yellow. The red scar of the plateau flamed incandescent till it parted in sheets of fire. The *Merlin* was lifted by a mighty force and thrown high, rocking and veering in a crazy effort for stability. A deep roaring came up to us, terrible, deafening.

Twice the scar glowed blood-red. Then utter darkness lay under us.

Right over the arch of heaven from its very zenith, a bright, flaming star sped, falling, falling . . . till the dark loom of the freed earth encompassed it.

THE END.

WHAT IS YOUR KNOWLEDGE OF AVIATION?

Test Yourself by This Questionnaire

THE questions given below are taken from the stories in this issue. They will serve, by your ability to answer them, to test yourself in your knowledge of aviation. By thus testing yourself, you will be able to fix in your mind a number of important facts of aviation that are presented by the stories.

The pages, on which the answers are given, follow each question.

1—What happens to the energy content of a body when it is lifted up? What happens when it falls back freely to earth? (Page 297)

2—What is the average velocity of a meteor? What relation, does that hold to the axial speed of a point on the equator? (Page 310)

3—What are "air pockets?" What causes them? (Page 312)

4—What is the greatest factor operating against higher speeds for aircraft? (Page 316)

5—What would happen if a shell struck a balloon filled with an inert gas? Why? (Page 333)

6—What are the characteristics of the infra-red ray? (Page 355)

7—How could a plane make itself comparatively noiseless? (Page 357)

8—How could planes be controlled from a central point? (Page 364)

AVIATION NEWS OF THE MONTH

CONSTRUCTION

New 180-Mile-an-Hour Plane for Army

IN carrying out the ideas of Anthony Fokker on the design of planes, the army has ordered two new planes from the Fokker Aircraft Corporation expected to make 180 miles an hour. By building the fuselage flush with the wings (which are thicker than ordinary wings) by having the motors on the wings, with their nacelles streamlined, according to the New York *Times*, the planes in flight will appear to be no more than single wings speeding through the air. The planes will be able to make their speed even with three passengers and the heavy army equipment. Twin 600 horsepower Curtiss *Conqueror* motors will drive these craft. Tail surfaces will provide control. The planes will probably be finished in five months.

Rocket Plane Makes Successful Flight

AFTER several unsuccessful attempts, the Junkers works at Dessau, Germany, finally got a successful flight from a rocket plane, says the New York *Times*. The rockets were arranged underneath the wings, and started by electricity. In this attempt no trouble was found in getting the plane into the air from the water.

It is expected from what has been learned of the plane's performances that six rockets will allow the plane to carry a load of 11,000 pounds. At the Esplanaud works at Essen, Germany, a new rocket plane is being built on the principles laid down by Max Valier, noted rocket engineer. The plane will be a one-seater monoplane without power or propeller. The pilot's seat is in the place usually occupied by the motor and the rockets will be behind the pilot's seat and above the wings.

Low Landing Speed Plane Developed

A PLANE has been developed which the maker, the Maximum Safety Airplane Company, declares is one ideally fitted for the needs of the average man. It overcomes one of the greatest needs of such a plane in that it has a landing speed of 20 miles per hour which, according to the company can be reduced to 18 or even 12 miles per hour after experience. The plane has a cruising speed of 125 miles per hour and a minimum flying speed of only 39 miles per hour. Its cruising range is 500 miles. The plane cannot be stunted, neither can it go into a tail spin. It is already being produced on a quantity production basis.

Dirigible With Wings Now

COMING from Los Angeles, Cal., is the news, according to *Modern Mechanics*, of a novel aircraft which will not only be a dirigible but will have wings, as on an airplane. Captain William F. Cooper of that city is the inventor. The craft will be 800 feet long, have a wing spread of 200 feet and will hold 3,500,000 cubic feet of helium. It will be manned by 25 persons and hold 125 passengers. The wings are to add additional lifting power to the ship and also to hold the motors used to drive it. A wheeled landing gear will allow the ship to land on the earth the same as an airplane. There will be seven motors driving thirteen propellers. Not the least of the features is the ability of the ship to land on the water—the hull permits that—and to travel through the water much faster than ocean liners.

General Dissatisfaction with Present Plane Motor

FROM a consensus of opinions on the present airplane engine, as written by Leo A. Kiernan in the New York *Times*, the idea is gathered that it must speedily make way for something more efficient. Henry Ford believes in the Diesel engine because of its simplicity and the possibility of using a vegetable product for fuel after our gasoline stores are exhausted. Charles L. Lawrence, president of the Wright Aeronautical Corporation, favors the turbine type because the power is developed more evenly. He thinks that the Diesel engine is too heavy and cumbersome. Frank Rentschler, president of the United Aircraft and Transport Company, however, favors a light air-cooled radial engine of high horsepower. He sees the Diesel as impracticable not only because of its weight but because the heavy crude oil used tends to become viscous at low temperatures. It seems though that present airplane designers have been caught in the rut of present theories and it remains for one with a fresh outlook to solve the vexing problem.

Great Long Distance Planes Projected by Caproni

SIGNOR GIANNI CAPRONI, Italian airplane builder, who has just allied himself with American interests is projecting several new giant planes which can make long distance commercial flights according to the New York *Times*. A 3,000 horsepower plane will have a range of not less than 10,000 kilometers (6,500 miles), but with no pay load. Another ship of 3,000 horsepower, however, could travel for 3,000 kilometers (1,800 miles), carrying five tons of pay load. It would have a speed of 220 kilometers (140 miles) per hour and will assure a twenty-hour service between New York and San Francisco with one landing half way. A New York-Genoa service is also possible by making three hops of about 2,000 kilometers each with stops at the Azores and Bermuda. This trip would take about forty hours. The planes for ocean service would not be able to take off from the water although they could land on it in case of trouble. A launching device would be used to lift the plane up after refueling and sending it down an inclined plane on a motor truck. With this momentum the plane could take off.

Dirigibles Must be Stronger Says *Times*

"VOYAGES of dirigible airships across the Atlantic will be continue to be adventures until fabrics are strengthened and more powerful engines are installed," says the New York *Times* editorially. Commenting on the exploits of the *Graf Zeppelin*, the paper quotes the statement of its commander, Dr. Eckener, who has declared that the ships are still not ready for regular service. Commander C. R. Burney, of the new giant British dirigible R-100 also believes that his own ship powerful as it is, is not yet what is finally wanted for regular oceanic service. The ships must be able to ride out storms and make headway against them. The ships for regular ocean service should, in Commander Burney's opinion, have between 9 and 10 million cubic feet (the R-100 has 1,350,000 cubic feet) and be so powerfully engined that it can cruise at a 100-mile an hour rate. These vessels should be able to regularly make the Europe to North America trip in two and a half days and the return trip in less than two days.

Defenseless Plane for Military Photography

A NEW type of plane is being developed by the Army Air Corps which would have equipment devoted to a single purpose and be built entirely for that purpose says C. B. Allen in the New York *World*. It would be an extraordinarily swift ship capable of climbing and remaining at an altitude of 30,000 feet. There, above the level at which fighting ships can operate, high above anti-aircraft guns, the plane could serenely map the enemy positions. However, the ship would have the knowledge that it had absolutely no means of defense against the enemy should one get close enough to open firing at it. All unnecessary weight, foreign to its purpose of photography, would be left off, even the heavy clothing of the aviators. They would be enclosed in heated cabins with oxygen for themselves and supercharged air for their motors. The development of military photography since the war has made such strides that now it is considered extremely important as an adjunct to the strategy to be employed by the higher officers.

Model Planes Make "Long Distance Flights"

THAT the building and operation of model planes is a sport that is taking hold of America is the belief of a writer in the New York *Times*. Over 200,000 persons are interested in it in one form or another according to the article. Such diminutive planes have made flights as long as a mile. One built by Tudor Morris of Peru, Indiana started from Atlantic City, N. J., on a trans-Atlantic flight, and remained aloft for 12½ minutes. A model owned by Frank Lauder of South Norwalk, Conn., after taking off, banked, came down on a three-point landing and after running along the ground took off again to an altitude of three hundred feet—all on one winding. Rubber bands remain the standard equipment for the models. A recent national meet at Atlantic City provided an opportunity for contestants to demonstrate their powers. This meet is believed to be a powerful incentive to model builders.

Airship Idea a Vain Dream

CALLING the *Graf Zeppelin* a Don Quixote of aviation, William L. Laurence, writing in the New York *World*, wonders why the lighter-than-air proponents have not given up the struggle to make airships a commercial proposition. The airship has too many disadvantages to be able to compete to anything serious in regular transportation service. The lighter-than-air builders "still persist in their belief, amounting almost to a fantastic delusion that the unwieldly, monstrous looking, tremendously cumbersome flying sausages can actually be put on a paying basis."

The writer goes on to the "flying sausage" as the [illegible] unable even to open a window to get a breath of fresh air. Added to this the pleasure of being pitched or rolled all over God's heaven, it will not take much horse sense to figure out that while such travel may be good enough for animals it is far from attractive to individuals going abroad for other than publicity."

Mr. Laurence also points out the fact that it takes a ground crew of 450 men to handle her on departure and landing. So far the U. S. Naval Station at Lakehurst, N. J., has helped out by berthing the ship free of charge. But when the operation of the ship on a pure commercial basis arrives, no hope can be seen for it.

OPERATION

Endurance Record Eclipses All Others

BY remaining in the air continuously for 420 hours and 21 minutes, Dale Jackson and Forest O'Brine have eclipsed by far all previous endurance records. In the air for 17 days the flyers had their plane refueled 47 times. Their record exceeding by 173 hours the previous record made by Reinbeft and Mendel. The *St. Louis Robin*, the craft used by the two flyers, made 25,000 miles in the trip. It can therefore be said that they made a non-stop flight equivalent to the distance around the earth at its greatest diameter. The average speed of the plane was about sixty miles an hour, and it consumed 3,520 gallons of gasoline.

Three-Cornered Struggle for Transcontinental Air Traffic

IN the course of six weeks three large air transport companies have offered various combinations of speedy service from New York to San Francisco. There promises, according to George Gardner in the New York *Herald-Tribune*, a lively fight for the existing traffic with the possibility of gradual reduction in rates. The Great Circle Route of the New York Central and Santa Fé Railroad with intermediate air travel taking sixty hours from coast to coast is eclipsed by the Transcontinental Air Transport's forty-eight hour trip of various hops by train and air. Now the Boeing company is projecting a thirty-hour all air service, which means that a man with a week's vacation could spend it at the Pacific Coast, taking a day each way for traveling.

110-Mile Speed Made In Water Taxi

LIEUT. ALFORD WILLIAMS, of the U. S. Navy, in a recent test on the Severn River piloted a navy plane on the river at a speed of 110 miles an hour. This speed was considered to be that at which the plane would take to the air and the demonstration was made to check the design of the plane. At times during the swift flight it seemed as though the plane would leave the water as it danced barely over the tips of the waves. The plane is said to be one of those to be entered in the Schneider Cup races in which America hopes to regain her lost speed laurels.

Six Months' Air Travel Provides New Record

WHEREAS the total miles flown in 1928 reached the ten million mark, in the first six months of 1929 there were 8,000,000 miles flown or on the basis of more than one and one-half times the 1928 record. The daily average for 1929 was 70,000 miles, which can be understood as indicating the extent to which Americans are using the air. Since the 1929 figures do not include many of the flying months the full year's record is expected to nearly double the 1928 mileage. The figures released by the Department of Commerce indicate that there are 30,000 miles of airway in this country of which 10,000 miles are lighted. Forty thousand passengers were carried for hire in the six months under consideration.

Weather Data Urgently Needed Says Guggenheim Fund

A PLEA for a national network of weather reporting stations to serve aeronautics is made by the Guggenheim Fund. That the development of aviation will be seriously retarded by the absence of such information is their belief. It is just this period of the development of aviation before planes have been built that can fly through any kind of weather that causes the great need for weather data. Later on it might not be needed so badly.

The report from the Fund states that at its own expense it maintained a weather service between Los Angeles and San Francisco and during that time not a single accident on that route could be attributed to the weather. The route was chosen because of the variable weather generally experienced.

On July 1, 1929, the Department of Commerce took over the weather service established by the Fund and will operate it as a government agency. This, the Fund hopes, will lead to the establishment of a general network of such services.

Endurance Flights Called Senseless

ENDURANCE flights are harder on the people on the ground than on those in the plane says C. B. Allen, Aviation Editor of the New York *World*, and they should be stopped. After a record of 420 hours in the air was made, little point could be seen to continuing the flights as nothing was to be gained. Aviation, he believes, had better turn its efforts to more productive fields of exploitation. Even Charles L. Lawrence, designer of the Wright *Whirlwind* motor can arouse little enthusiasm about them any more. They have already proved their main point by increasing public confidence in the stability and endurance of aviation motors.

Parachute Becoming Important in Aviation

INCREASING in importance as a factor of safety in aviation is the parachute, according to William L. Laurence in the New York *World*. Great developments of the parachute have taken place since the world war, until at present parachutes have been developed capable of bringing an airplane down in safety. Their use will be also to drop cargoes to the ground in case of damage to planes and also to land parties of troops from airplanes. In one experiment a group of five men and a machine gun were landed and the gun was in action within fifteen minutes after they left the plane. They could also be used to assist night bombing or photography by carrying magnesium flares and lighting up the terrain to be studied.

"Aviation News of the Month"

portrays in plain, yet concise language every important aviation advance during the month. Nowhere can the average reader get such a wealth of accurate and vital information condensed into such a small volume. Some 40 aviation magazines and newspapers are utilized by our editors in the compilation of this department. The publishers welcome short contributions to these pages from the various scientific institutions, laboratories, makers and distributors of planes, etc.

Lufthansa to Open Regular Ocean Service

LUFTHANSA, the great German aviation company on the completion of successful tests of three great flying boats, will shortly begin a regular ocean air service between Travemuende Germany, and Pernambuco, Brazil. Due to the loss of a government subsidy they will not be able to carry passengers as planned (they are not very profitable) but will carry only mail and freight. The route to be taken will be via Lisbon, Canary Islands, Cape Verde, Fernando da Noronha and Pernambuco where connection will be made with the Condor Syndicate operating through South America. A weekly service will be made each way with the possibility, if successful, of extending the service to the United States. Exhaustive air tests have already been made of the three Romar flying boats and so far they have proved successful. A distance of 2,500 miles was covered in 25 hours, and inasmuch as the greatest hop on the new route is 1,500 miles the company feels little doubt about the safety of the proposed schedule. The boats will be able to alight on the water, and special arrangements have been made to prevent damage of the motors by the water or prevent them from being exploded when overheated.

Headwinds Cause Failure of East-West Ocean Flights

THAT it has already been definitely proved that the east-west Atlantic non-stop flight is not possible as a regular thing, is the belief of Lauren D. Lyman in the New York *Times*. Headwinds blowing from west to east are a characteristic of the ocean in the northern hemisphere and planes as now constructed cannot successfully battle them. A chart in the office of Dr James H. Kimball, of the Weather Bureau in New York, shows definitely the course of winds over the ocean. Only in the South Atlantic between latitudes 30 degrees north and 30 degrees south is the wind from east to west. Below and above that belt it blows steadily to the east. Those flyers therefore who have tried the east west hop, and many of them have died in it, have used up their fuel in battling the terrible winds. The *Graf Zeppelin*, which on its first voyage took 111 hours to make the flight to America, was able to make the return trip in less than half that time. Dr. Kimball himself believes that our planes are not yet ready for the Europe-America flight in the northern hemisphere. Planes able to hold a great reserve of fuel and possessing much more powerful plants than are now in existence must come first.

Azores Routes Believed Real Trans-Atlantic Passage

THE route over the Azores and the West Indies with stops at those places is coming to be accepted as the logical place to start trans-Atlantic travel, according to Reginald M. Cleveland in the New York *Times*. The writer cites the European opinion on this question and that of Signor Caproni, Italian plane builder. The discovery of a shelf in the Atlantic which will facilitate the building of the first seadrome will be a great incentive to the starting of a trans-Atlantic service on the Azores route.

Planes Fly Too Little Asserts Executive

THAT we are resting on the speed laurels obtained by our planes and are, of a consequence, using them less than two hours a day is the belief of Harris M. Hanshue, head of the Western Air Express, says Francis D. Walton in the New York *Herald-Tribune*. When a plane completes a run of a few hundred miles it is considered to have done a day's work and is therefore run into its hangar for about twenty-two hours' rest. This theory is wrong, says Mr. Hanshue, if planes are to pay for themselves. They must be run seven or eight hours a day. And if the depreciation of the plane will be more rapid on that basis, still planes will have served their usefulness before they must be discarded for newer models. Mr. Hanshue compares the less than two hours a day used by planes to the twenty hours a day which the Twentieth Century Limited train serves in order to pay for itself.

Flying in Comfort Now an Actuality

AFTER making an extensive air tour about the country, J. C. Martyn, writing in the New York *Times*, comes to the conclusion that one can really fly to almost any place from any place in the United States in perfect comfort. In the past year there has come an amazing change in the mode in which people can travel by air. The word 'de luxe' has been used so much that it has almost lost its meaning but in traveling on most large airlines in this country it is an actuality. Comfortable seats, luncheons, perfect service is attained. The only man to a passenger's enjoyment may be his frame of mind. He may become 'airsick' because of the air bumps and because he is under a great nervous strain. But if he can relax, say Mr. Martyn, he can find that he can travel almost everywhere in the most enjoyable fashion.

Although two schools are making a lot of noise about the safety in aviation, one pointing pessimistically to the list of accidents and the other conjuring up the idea of perfect safety Mr. Martyn finds that traveling is as safe as the man who flies the plane. There is no longer the question of the mechanics of the plane, but the tendency to stunt, errors in the judgment of pilots and carelessness in handling the planes are what cause the front page stories about smashups.

(*Continued on page* 381)

THIS department is open to readers who wish to have answered questions on Aviation. As far as space will permit, all questions deemed of general interest to our readers will be answered here. And where possible illustrations will be used to answer the question. Queries should be brief and not more than three should be put in any letter. Address all communications to the Editor

Combat and Pursuit Planes

Editor, Aviation Forum:

When reading war stories I have often come across the two terms "combat plane" and "pursuit plane." Will you please tell me through Aviation Forum the difference between these two.

HAROLD MORGAN,
Toronto, Ontario.

(The term "combat" plane is a little misleading as it gives the impression that the plane has for its primary purpose combat. To give an illustration the Curtiss *Falcon* combat plane is a two-seater carrying machine guns as offensive equipment but equipped for observation which is its main purpose. The Curtiss *Hawk* pursuit plane is a light single-seater carrying a machine gun but swift and possessed of great maneuverability. Its only purpose is fighting, for which its swift speed, much swifter than the combat, admirably fits it.—*Editor.*)

The Irresistible Body

Editor, Aviation Forum:

My friend and I have had quite a discussion over what would happen if an immovable object were hit by an irresistible body. I hope you will answer this perplexing question for us in your new departments for questions and answers.

HARRY ABISH,
New York City

(The difficulty with this well-known question is that it assumes the existence at the same time of two things which are mutually exclusive. In other words the meaning of an "immovable object" is that it can resist anything. Therefore you assume that there is no irresistible force. And, conversely, by assuming that there is an irresistible body you mean that nothing is immovable against it. So you see the question itself fails because it assumes two things that cannot exist together.—*Editor*)

Speeds Made by Planes

Editor, Aviation Forum.

I have just received my third issue of Air Wonder Stories and I liked every story in them.

Here are a few questions I would like to have you answer:

1. What is the speed of a Curtiss *Hawk* pursuit plane?
2. What is the greatest speed an airplane has ever traveled?

JACK QUELLE,
Burlington, Iowa.

(The recorded speed of a Curtiss *Hawk* pursuit plane is between 160 and 170 miles an hour. The highest recorded speed, the official record for speed in an airplane is that held by Adjutant Bonnet of France who made 278.5 miles per hour. A seaplane, however, piloted by Major deHernardi of Italy made [illegible] miles per hour.—*Editor*)

What is Orientation?

Editor, Aviation Forum.

I certainly was glad when I read that you were going to have a question and answer department for aviation, and I'll bet you will get plenty of questions.

In the September issue of Air Wonder Stories, you used the word *orientation* in the article "The Airplane of the Future." If this applies to aviation, please give the meaning.

LINSLEY HEGELHEIMER,
Niagara Falls, Ontario

(Orientation means simply the determining of one's direction. In other words if a flyer wishes to go northeast by north he will want to know whether he is oriented right—whether he is faced in the right direction. He will want to determine his "bearings" in other words. The term is now in general use to mean the determination of one's bearings. Its original meaning was the determining of one's direction with relation to the east [the Orient]. *Editor.*)

What Is the Principle of Aviation?

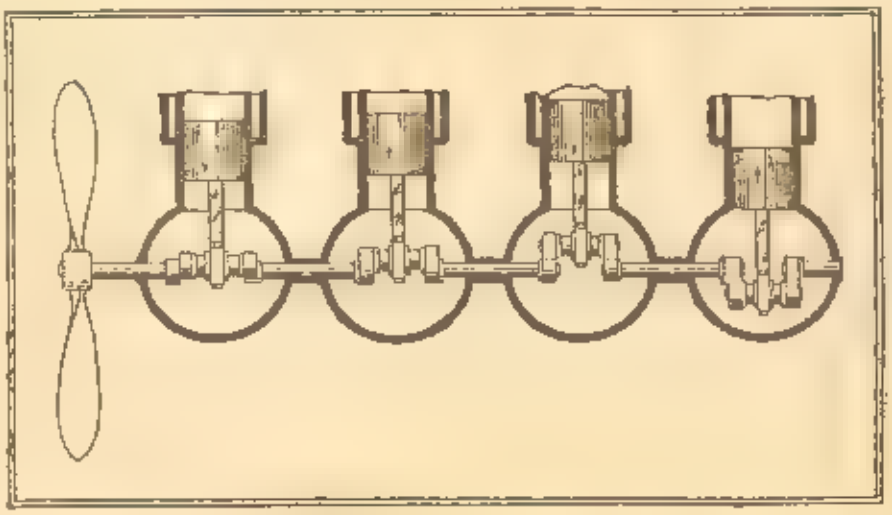
Editor, Aviation Forum:

Your magazine is magnificent, but it is vastly improved by the addition of Aviation Forum. It was very pleased to see the advance notice of the new department as I have many questions to submit.

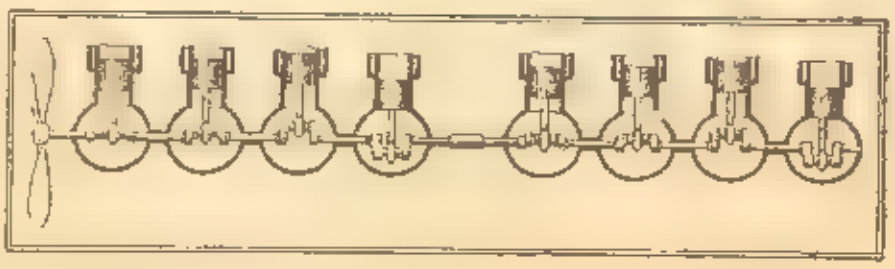
1. Is an aviation or airplane gasoline engine run off a crankshaft in the same manner as an automobile engine?
2. What is considered the best type of plane, all things considered, a monoplane or a plane with more than one wing?
3. What nation is foremost in the development of aviation, both commercial and military?
4. Can more than one motor give power to a single propeller?
5. What is the principle of aviation, as now understood?

In closing let me say Air Wonder Stories is a "wonder" itself.

FRANK K. KELLY,
Kansas City, Mo.



Showing how a four-cylinder engine drives the crankshaft which is directly connected to the propeller shaft which rotates the propeller. The arrows show the direction of motion of the pistons



Here in reduced size is shown how two four-cylinder engines can be directly connected on the same shaft to drive one propeller.

(1. The methods of connection in airplane and automobile engines are approximately the same. The piston rods operate the crankshaft, which in turn operate the propeller shaft. Answering question four it is easy to see that as many motors as may be desired can run one propeller. All that is necessary is that they all be in line and turn the same propeller shaft.

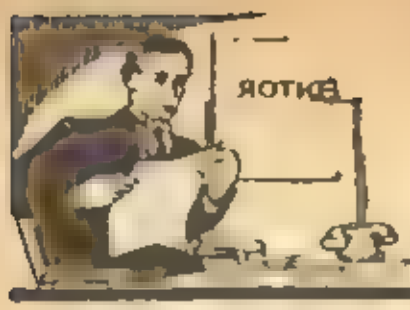
2. Airplanes are today made for definite purposes. If one wishes speed he picks a plane whose design has been made for speed. The same might be said for power, endurance, climbing ability, etc. A monoplane is speedier but in order to give the same carrying surface to the wings (and the same lead), they must be made very large. The biplane gives a greater carrying surface in a compact area. Therefore the monoplane has been used for speed and the biplane to carry heavy loads. But, with the use of metal wings, the possible span has been increased greatly and therefore the biplane's only advantage is slowly being taken away.

3. Germany is considered the leader in the development of commercial planes (the peace treaty forbids her engaging extensively in military aviation). France is considered the leader in the development of military craft.

4. Answered under 1.

5. The principle of heavier-than-air aviation is to propel a craft through the air by either the tractive effect of a blade on the air, thus drawing it forward; or, in the recently-developed rocket, by exhausting highly-compressed gases and being propelled by the reaction to them. The craft is supported in the air by the upward pressure under the wings against the vacuum above the wings. "Lighter-than-air" craft are supported by a large volume of lighter-than-air gas, such as hydrogen or helium, enclosed in a container. The difference between the weight of the gas and the weight of air displaced provides the "lift." If the craft is a dirigible it is propelled like a plane by motor-driven propellers. —*Editor*)

(*Continued on page 374*)



THE READER AIRS HIS VIEWS

IN this department we shall publish every month your opinions. After all, this is your magazine and it is edited for you. If we fall down on the choice of our stories, or if the editorial board slips up occasionally, it is up to you to voice your opinion. It makes no difference whether your letter is complimentary, critical, or whether it contains a good old-fashioned brick-bat.

All of your letters, as much as space will allow, will be published here for the benefit of all. Due to the large influx of mail, personal communications to this department are answered individually only when a self-addressed envelope with sufficient stamps to cover time and postage is remitted.

Why Not "Men With Wings"

Editor AIR WONDER STORIES:

In the August edition of AIR WONDER STORIES a certain Mr. Britt wrote and said he didn't think much of "Men With Wings." His letter has been published in "The Reader Airs His Views" section. No doubt it is a little far-fetched as he say, but again it gives us scenes of *Men With Wings*. Who knows, maybe on some planet, some day, yet to be visited by earthmen, there is a race with wings. In this story, the author gives us an impression regarding the wonderful race.

Mr. Britt remarks that it is "punk science." There I disagree with him entirely, for it tells of this Scotchman, in the fifteenth century, taking glands out of a bird and putting them into a mouse. Soon after the mouse's back had two small lumps which afterward became wings; and how he put the glands in his wife's mouth and did the same with his own. Then when his grandchild came it had undeveloped wings instead of arms. Soon afterward when he was sent out of England he came to America and continued his building up of his family which some day was to become a great race. Now I ask you if that isn't science, what is?

There were other stories almost as good, but I think "Men With Wings" was the best complete story in that issue and I hope others will agree with me in that, though "Islands in the Air," "The Beacon of Airport Seven," and "The Bloodless War" were A-1 stories "The Ark of the Covenant" is one of the best stories that I have ever read.

JOHN GOUGH,
Beechhurst, Long Island, N. Y.

(We think that Mr. Gough states quite correctly the case in favor of "Men With Wings." Although according to a noted scientist, J. B. S. Haldane, men would have difficulty in using normal wings, yet Miss Stone overcomes that by having them quite long. And as Mr. Gough says, we can repeat, surely in all the worlds of our vast universe there is more than one in which an intelligent creature like man in the process of *conscious or unconscious* evolution has developed wings. Remember we earthlings have existed a mere few hundred thousand years as sentient beings. There may be races who have existed with a civilization for hundreds of millions of years. We would be looked on as the veriest savages. And we will be like them only when we have traveled much further along the road of evolution. And as Miss Stone puts her story far into the future there is no bar to the development of what she suggests, coming as a development of our scientific knowledge.—*Editor.*)

More or Less Serials

Editor AIR WONDER STORIES:

I may as well free my mind of certain opinions which may or may not be of value to you. Here they are:

Your serial, "The Ark of the Covenant," is very good—but is too long. Two parts is plenty long for a serial to run. I must confess that I, for one, do not like to have to wait a whole month for the next issue just when the story is becoming most interesting. When a story is given in two parts, we can wait until we have both issues before starting the story, but to wait four months before reading a story is long—too long! And besides I don't keep the magazines that long.

Otherwise your magazine cannot be beat. Your stories are all interesting and enough science and aviation is given for one to absorb easily.

And now for your companion magazine, SCIENCE WONDER STORIES. In your July issue you have three serials running at one time. That is why I am doubtful if I am going to get any more of these magazines, as much as I enjoy them. One serial in each issue is plenty; two serials are much too many; and three . . .? By the way, you do not have to run serials to keep your circulation constant, if the magazine is good, serials are an objection to many, like myself; if the magazine is bad—but we don't have to consider that because your magazines *are* good, no doubt about that.

By the way, the only feature I did not like [illegible] was "The Problems of Space [illegible]

To repeat, I think you are making a serious mistake in starting another serial at the same time the first one ends. Readers, like myself, who like to buy at the newsstand, will not be influenced to buy each issue just because a serial is running. Rather, we would stop buying it altogether. All you have to do is to make your stories interesting—then don't worry about us missing any issue; we won't!

JOHN R. KIESSLING,
Cincinnati, Ohio.

(Mr. Kiessling poses a problem that we would do well to refer to our readers. What, we ask, is your point of view with regard to serials? Do you like them at all? How long should they run? Do you want one to begin [illegible] one ends? We can only satisfy you if you write and tell us your point of view as Mr. Kiessling has. WE WANT YOUR VOTES ON THIS. The majority wins.—*Editor.*)

An Inventor's Experience

Editor AIR WONDER STORIES:

[illegible] action age why shoot impossible bunk for consumption. For children yes, but for the average citizen bunk. Of course I have been doping on the game since Frank Tousy published "Frank Reade and His Airship" 40 years ago and [illegible]

But he only had a giant helicopter with horizontal propellers on top of the masts, and [illegible] he had to do to make [illegible]

Extend the masts and connect great airplane balloons on the masts above each [illegible] independent navigation equipment and stay the combined series with halyards.

I sent this design to the Navy's contest [illegible] a patent last January.

[illegible] hulls of the airplane balloons to heat [illegible] pressure of the helium gas, it cannot escape, and as hot air is as good for the same pur[illegible] from the exhausts of the engines they will be made more capable. Of course my design is to [illegible] power plants, engines, generators and fuel and [illegible] equal the pressure of the helium gas inside of the containers to prevent its escape and also to act the same as the gas in hot air balloons. But as there will be continual replenishment of this hot air exhaust, it will be greater than the hot air balloons, as they had no supply after rising in the air.

Therefore why publish misleading bunk as you were anticipated 40 years ago. This is the aviation age. The public know something of aviation.

If you show ideal practical prospects in your stories there will be more interest taken in them by your readers.

I guess I am about the only one who has made any improvement in the prime mover, by burbanking, combining the rotary and reciprocating engines. Now I have the prospect of the use of the heat exhaust of the engines, patent applied for.

Also of the combination of aviation principles, aeroplane balloons and helicopter hull.

By adding series over series on the masts of the giant helicopter hull you can create this 25,000-ton airship.

I had figured 500 tons to 5,000 tons and I can show the prospects, with this combination principle.

Well I threw that hot air exhaust bomb into the Zeppelin-Goodyear works and they threw it out as no good.

Then I have hurled it into the Navy's Board and will see what they will do with it.

Also at the Detroit Aircraft Co. and have not as yet learned their opinion.

I have the patent applied for, and I have sent the plans to Europe, Russia, France and England so that they will find it may stroll over the ocean to visit them.

HUGH T. DUNN,
Mariners' Harbor, S. I., New York.

(We read over Mr Dunn's letter with a great deal of interest and instruction. That some of the ideas mentioned in our stories have already become realities or were thought of before is a source of gratification. Mr. Dunn [illegible] probably realize that the public and even official attitude toward aeronautic ideas has changed immensely since he began working. Then the inventor was met with sneers, now he is listened to respectfully and even credulously. The world wants aviation and anyone with an improvement will find the world and its purse open to him. We wish Mr. Dunn the best of success.

As for our "bunk," Mr. Dunn with his experience of having unbelieving people listen to him, surely will not be too ready to stamp anything as impossible. He must realize that we have only scratched the surface of aviation possibilities, and in the minds of men now living are fermenting inventions such as to make our own achievements seem puny.—*Editor.*)

Has New Aviation Ideas

Editor AIR WONDER STORIES

I just bought AIR WONDER STORIES, and I must say I like them. Why I bought your magazine is because I read stories published as written by Hugo Gernsback before in his former magazines, and I like all stories pertaining to the future. I'm deeply interested in aviation and its improvements. I [illegible] And it will grow to be a great industry in less years than it took the automobile. S. I want to get in touch with the head of aeronautics in Washington, D. C., or some great firm that would be interested in my ideas.

JOHN MEEKO,
Jersey City, N. J.

(We believe that Mr. Meeko [illegible] government eager to learn about h[illegible] David Ingalls, who is Assistant Secretary of the Navy for Aeronautics, located at Washington, is a good man to write to.

We agree with him heartily as to the future of aviation. At present there is little to limit its possibilities except the limitations of power. And new ideas on providing power are on the way. They will startle us more than the first idea of aviation startled the people of the early 1900's. We will be interested to learn how Mr. Meeko fares as we wish him every success.—*Editor.*)

(*Continued on page 377*)

CLIPPINGS

The Comic Spirit of America's Press

Here's to Clippings---

WE are indebted to CLIPPINGS, a new monthly magazine, for a lot of laughs. Do you know CLIPPINGS? No? Well, it is a new magazine published by Eddie Schoen, one of our star humorists, and we have no hesitation in saying that there are as many or more laughs to the page than in almost any other magazine you may pick up. Mr. Schoen takes the cream of the humor from other publications, clips them (there's where CLIPPINGS gets its name) and adds his own comment, whimsical, mirthful, sad or what have you. Whatever the comment is, it goes like an arrow to the mark and gives you a laugh or stores up a new thought. Life at best is a sad old game, and we maintain that anyone or anything that can give you an added laugh a day is fulfilling a mighty worthy mission. The next time you pass a newsstand get a copy. If you don't get yourself a lot of laughs we will personally refund the money you paid for CLIPPINGS. That's going some when you figure that your editor is a Scot and prying a penny lose from him is like blowing over a mountain with a summer zephyr.

CLIPPINGS

Beginning with the September, 1929 issue, CLIPPINGS switches from quarterly publication to monthly. The demand for the early issues as a quarterly did the trick.

Everybody enjoys seeing a serious problem smacked in the eye with a few well-directed loose-baked pies! Out-worn conventions, and holier-than-thou-hypocrisy should get it in the neck—and CLIPPINGS, The Comic Spirit of America's Press, is doing the necking! CLIPPINGS has a future as one of the funniest books on the stands and simply because so many funny things are pulled off in the course of a year. The editors keep their eyes open and their tongues in their cheeks. The readers eat it up.

Attend to the display and distribution of this little book and watch it pile up circulation!

Special Offer to New Subscribers

New subscribers are the life of our party (any advertiser will tell you that) just as the regular reader of CLIPPINGS becomes the life of any party (and why not with such a supply of "nifties" and bon mots). Our offer to new subscribers is interesting. We will send you CLIPPINGS for six months beginning with the October issue for one dollar. Get that? Six months of lively reading, of barbs sweetened with honey and honey spiked with barbs.

Now, to business. Unless you fill in the coupon below and attach it to your dollar, this bright piece of advertising literature is a flop. Do it now, while the thought is fresh in your mind.

SPECIAL SUBSCRIPTION

6 Issues for $1.00

Circulation Manager WS-1029
CLIPPINGS,
308 W. Washington Street, Chicago, Ill.

Enter my subscription to CLIPPINGS for six months beginning with the October issue. My dollar is attached.

Name .....

Address .....

City .....State .....

AVIATION FORUM

(Continued from page 371)

The Earth Inductor Compass

Editor, Aviation Forum:

I notice that you have an "earth-inductor" compass in the picture of the "Ai plane of the Future" in the September issue. I have heard quite a bit about this marvelous invention and wonder if you will describe how it operates to give planes their direction. A diagram would be much appreciated, as it will help my lay mind to understand it.

WILFRED B. NORTH,
Cincinnati, Ohio.

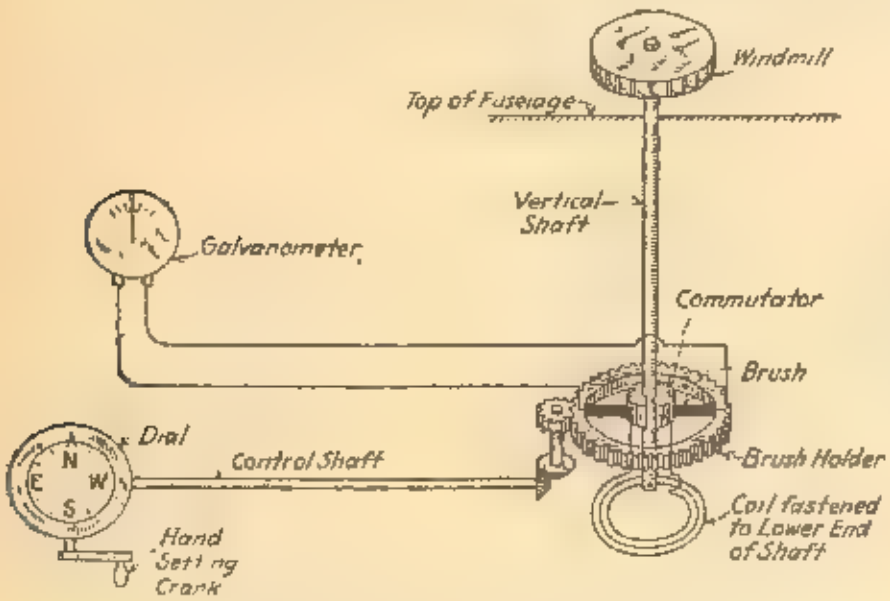


Diagram showing the internal workings of the earth inductor compass. The windmill is exposed above the fuselage and the galvanometer is in plain view of the pilot.

(From "The Airplane and Its Engine"—Chatfield and Taylor)

(The diagram below will illustrate the principle of the earth-inductor compass. It consists of three parts, a generator, a control and a galvanometer. The parts of the generator are shown as the commutator, brush and coil. The generator is operated by a windmill, the force of the wind against the vanes rotating the vertical shaft. The pilot sets the control dial on the path that he wishes to take; say west. This setting of the dial automatically sets the brushes on a magnetic east-west line. When the brushes are in the east-west line the output of the generator is a minimum and a maximum output is reached when they are in a magnetic north-south line. Inasmuch as the only field of the generator is the field induced by the earth's magnetism; then, it can be seen, if the pilot keeps on an east-west course there will be no output of electricity to the galvanometer, which will then register zero. But if he gets off his track and starts north or south the coils will then be cutting the earth's magnetic lines and there will be an output to the galvanometer. The pilot will then adjust his course until the galvanometer reads zero again. If he travels north or south his galvanometer should have the maximum reading.—*Editor.*)

The "Three-Point" Landing

Editor, Aviation Forum:

In many news items and stories about aviation flights I have heard the expression that an aviator made a perfect "three-point" landing. Will you please explain through your new department what this means.

Accept my congratulations on AIR WONDER STORIES. It is getting better and better. The new department, "Aviation Forum," is certainly a valuable addition.

HOWARD S. SANDS,
Detroit, Mich.

(A land airplane has three supports for landing, the two wheels and a landing gear. It is possible therefore on landing for the wheels to touch the ground first and then for the landing gear to "slump down," or the nose of the plane may be tilted up when the plane reaches the ground and then the wheels will drop. In either of these landings there is quite a jar to the plane. The perfect landing is a "three-point" landing which occurs when the pilot so skillfully maneuvers that the plane glides to earth and near the ground flattens out so that the three points all touch or skim the ground at the same time. This is a thing that really determines the skill of the pilot for the landing is generally acknowledged to be the most difficult part of the operation of a plane.—*Editor.*)

The First Atlantic Flight

Editor, Aviation Forum:

I have been having quite a controversy with my friends on who actually flew the Atlantic first. Everybody seems to have a different opinion on it so we turn to an authority for an answer. Please publish this soon in your magazine as we are all anxious to learn who is right.

BERTRAND LEWIS,
Denver, Colo.

(The question Mr. Lewis asks is a natural one, for since the famous Lindbergh flight of 1927 all previous attempts have been relegated pretty much to the background. We assume that Mr. Lewis means the first non-stop flight. On June 14, 1919, eight years before the Lindbergh flight, Captain John Alcock and Lieut. Arthur W. Brown flew from St. John's, Newfoundland, to Chiden, Ireland. The trip covered 1,890 miles and was accomplished in 16 hours. This, however, was preceded by the flight of the Navy's ship NC-4 from Trepassey Bay, Newfoundland to Lisbon, Portugal. The flight of the NC-4 was not a non-stop flight as stops were made in the Azores. The NC-4 continued its flight to England and covered altogether 4,761 miles. If the first non-stop flight is meant we should give Alcock and Brown the honors.—*Editor.*)

CLARENCE D. CHAMBERLIN says: *"It ought to be read by everyone."*

SKYLARKING

THE ROMANTIC ADVENTURE OF FLYING

By BRUCE GOULD

Share the thrills of flying with an expert aviator who fires your imagination as he clarifies the whole business of aviation. Here is a history of aeronautics, anecdotes about well-known flyers, and a startling prophesy for the future of aviation.

"It is fine that such a good writer on aeronautics should have written so excellent a book. Good reading from cover to cover, its appeal is to airmen and ground-lubber."—*N. Y. Times.*

"Charged throughout with enjoyment. . . . Not only the exhilaration of flying but its history as well."—*N. Y. Herald Tribune.*

"This may come in time to stand as the first book heralding a new age."—Harry Hansen, *N. Y. World.*

Second Printing *Richly Illustrated* $2.50

COUPON — TEAR HERE

STELLAR PUBLISHING CORP.
80A Park Place,
New York, N. Y.

Please send me a copy of SKYLARKING, by Bruce Gould, price $2.50 (ten cents extra to cover postage)

Name .....
Address .....
City ..... State .....

25c
THE COPY

On All Newsstands

A GERNSBACK PUBLICATION

The Best That's In Radio

RADIO-CRAFT—the latest and most up-to-date Radio magazine. Edited only for the set-builder, the radio-constructor, the experimenter and the radio enthusiast who believes in radio craftsmanship.

"The Newest Hookups; the latest things in Radio; every new article and apparatus brought out, radio construction galore; service man's data; short wave dope by the ream; a real big section on questions and answers; blue print articles in profusion—in short you'll get a "He-man" radio dope sheet that's chock full of the very stuff you want, in language that's your own.

Contents for the October Issue:

THE SHORT WAVE SCREEN GRID CRAFT BOX
By Beryl Baker Bryant

TRI-CHROMATIC TELEVISION
By Herbert C. Ives

A "350" PUBLIC ADDRESS POWER AMPLIFIER
By S. L. Baraf

RADIO RECEIVING TUBES
By [illegible] W. Palmer

FROM MICROPHONE TO MODULATOR
By C. Sterling Gleason

LATEST THINGS IN RADIO

RADIO CRAFT KINKS

SERVICE MAN'S DATA

INFORMATION BUREAU

BOOK REVIEW

SPECIAL OFFER

EIGHT MONTHS FOR $1.00

Canada and Foreign $1.25

TECHNI-CRAFT PUBLISHING CORPORATION
WS-1029, 98 Park Place
New York, N. Y.

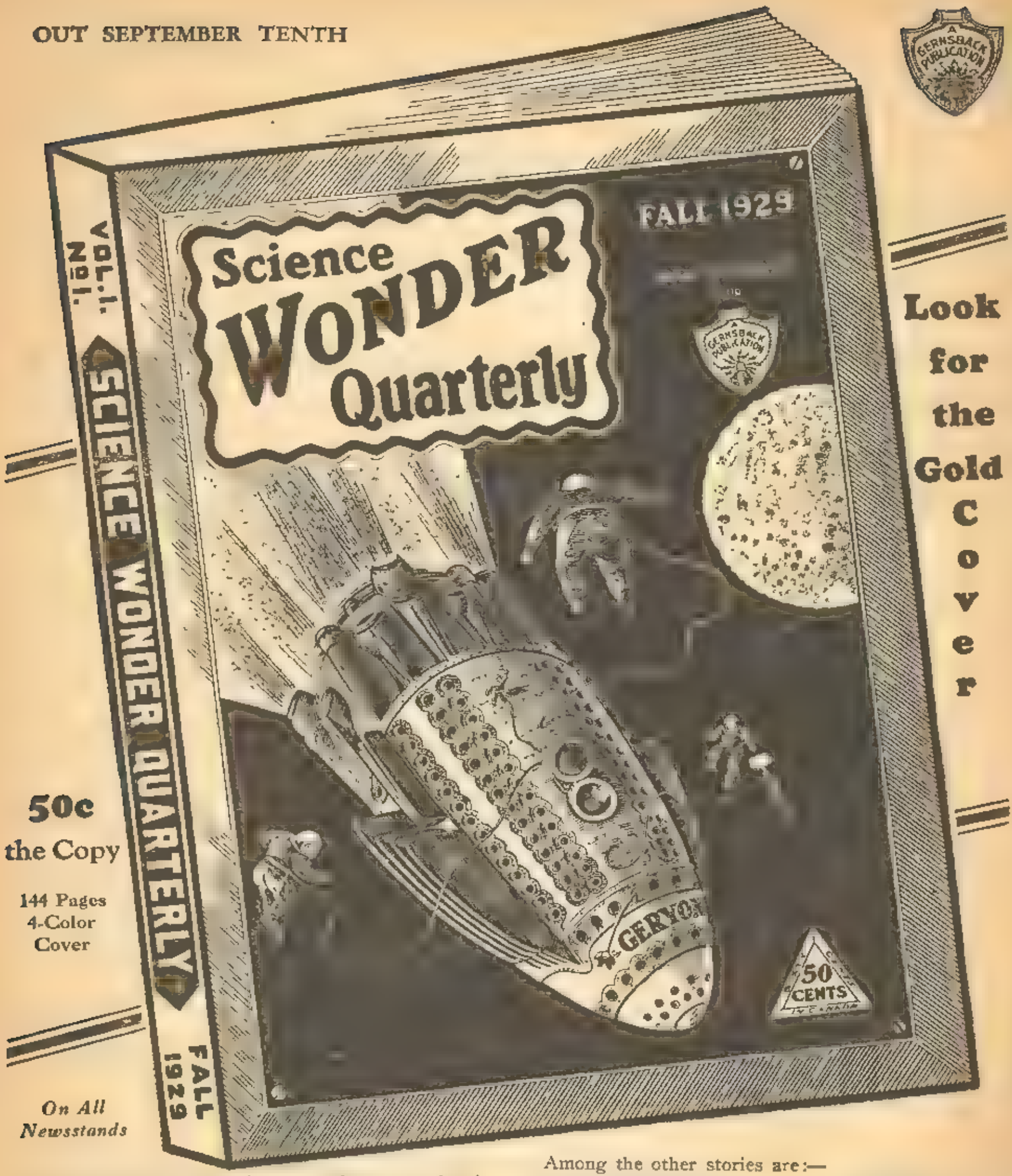
Enclosed find $1.00 for which please enter my subscription to RADIO-CRAFT for eight months

Name .....

Address .....

City and State .....

OUT SEPTEMBER TENTH



Look for the Gold Cover

50c
the Copy

144 Pages
4-Color
Cover

On All Newsstands

Pursuant to many inquiries from our readers, we are pleased to announce that the first issue of the SCIENCE WONDER QUARTERLY will be on all newsstands on September 10th.

We have secured for the first issue, the American rights of a complete new novel by the famous German science fiction author, Otto Willi Gail. Far from being fantastic, this story has the very vitals of reality in it. Interplanetary problems become those serious things that are part and parcel of our everyday life. You will be stunned by the truths that this powerful writer gives you. This is one of the most unusual interplanetarian stories ever published. The title of the story is

"THE SHOT INTO INFINITY."

Among the other stories are:—

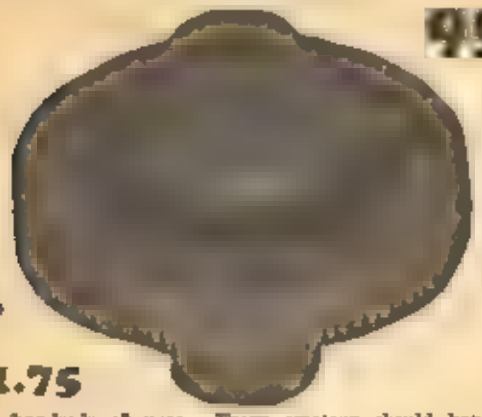
THE HIDDEN WORLD — *By Edmond Hamilton*
INTO THE 28th CENTURY — *By Lilith Lorraine*
THE ARTIFICIAL MAN — *By Clare Winger Harris*
And Others.

The subscription price of the QUARTERLY is $1.75 per year, single copy 50c.

To all charter subscribers, a special price of $1.25 per year is available now. This offer will be positively withdrawn after thirty days. Address all subscriptions to:—

Stellar Publishing Corporation
98-WS Park Place — New York, N. Y.

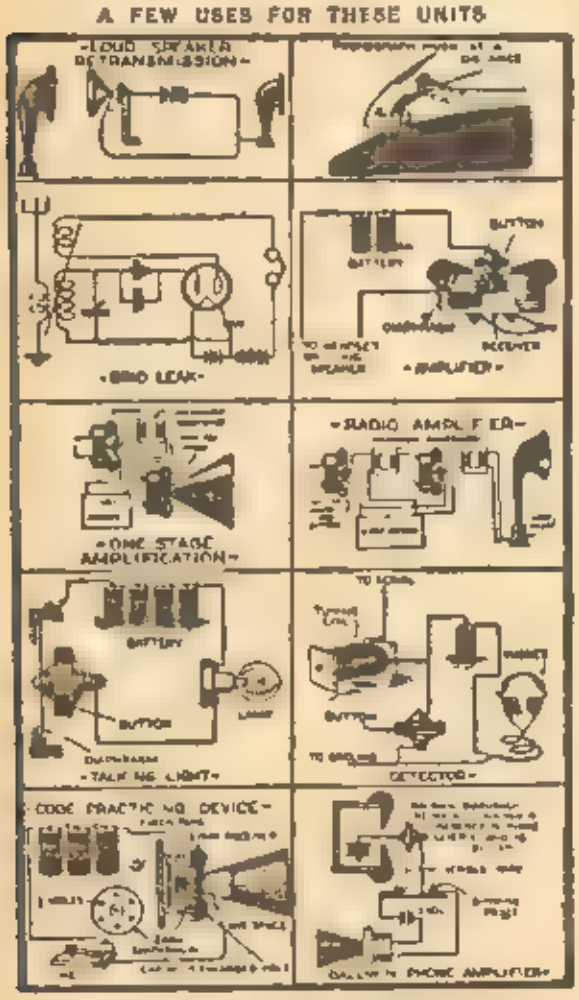
SKINDERVIKEN Transmitter Units



Two for **$1.75**

Have hundreds of uses. Every amateur should have two or three of these amplifiers in his laboratory

A FEW USES FOR THESE UNITS



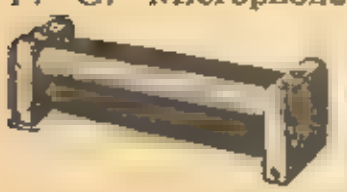
12 PAGE INSTRUCTION BOOKLET

containing suggestions and diagrams for innumerable uses, furnished with each unit.

WE PAY $5.00 IN CASH

for every new use developed for this unit and accepted and published by us.

P. G. Microphone Transformer



A Modulation Transformer specially designed for use with the Skinderviken Transmitter. Has many [illegible] Primaries [illegible] are 45 ohms

$2

FOR SALE AT LEADING DEALERS

Or Order Direct, Using Coupon Below

SEND NO MONEY

When the postman delivers your order you pay him for whatever you have ordered, plus a few cents postage.

PRESS GUILD, INC. A-10-29
16-16-A—East 26th St., New York, N. Y.

Please mail me at once as many of the following items as I have indicated.

....Skinderviken Transmitter Units at 95c. for 1; $1.75 for 2; $2.50 for 3, $3.20 for 4

P. G. Microphone Transformers at $2

When delivered I will pay the postman the cost of the items specified plus postage.

Name .....

Address .....

City ..... State .....

THE READER AIRS HIS VIEWS

(Continued from page 372)

Tells Club About Science Fiction

Editor AIR WONDER STORIES:

I just finished reading the September issue of AIR WONDER STORIES and I want to compliment you on the fine work you have done. I belong to a club that meets four times a week. Whenever the other members want a story I tell them one from one from your publications, and already many of them are following my advice and getting copies.

David H. Keller is excellent—give us more. "Men With Wings," by Leslie Stone, was alright as fiction, but the science was "punk."

"The Ark of the Covenant" promises to be one of the greatest stories you will ever publish.

Artist Paul is outdoing himself. Don't let him be taken away from you. I admit that his human faces are a little off track, but otherwise he is practically perfect.

What you give is a better than any paper.

Like [illegible] the Aviation Forum. Most of your authors regard the modern airplane as a toy, and besides, if we want to learn about the kind of things it teaches, we can look it up. Furthermore, I subscribe to AIR WONDER STORIES and SCIENCE WONDER STORIES purely for enjoyment, and to study reminds me of school. (Not that I dislike school in particular, but "there's a time for work and a time for play.")

I am only twelve, and it is gratifying to know that there are other admirers of your publications as young as I. (I refer in particular to Eugene Dow, Jr.)

The idea of printing pictures of the authors is a good one, and I suggest that for the next few months you print pictures of yourself and the Board of Associate Editors, including Paul, at the rate of one or two pictures monthly. By the way, does Paul draw the pictures of the authors?

ROBERT BALDWIN
Evanston, Ill.

(We are glad to see that this young enthusiast is spreading the gospel of science fiction. He is doing a favor to his friends and reflecting credit on himself. We are sorry though that he does not like the Aviation Forum since it is meeting with such [illegible] approval from [illegible]. This is [illegible] part [illegible] by the [illegible] of questions we have received. We are [illegible] numbers as it is [illegible] keeping the forum segregated to a small section of the [illegible]. That gives us the opportunity to answer fully a few of the many questions.—*Editor.*)

Return of the Mad Scientist

Editor AIR WONDER STORIES:

The Silent Destroyer by Jerzik Dahl Tate, was excellent. I do hope we are going to get Mr. Tate to write some more stories about the war between the two races for possession of the earth.

"[illegible]" by Ed Earl Repp, was [illegible] as far as I could see got the reader nowhere.

"The Ark of the Covenant," by Victor MacClure, was great and I wish I did not have to wait a whole month for the next installment.

"The Planet's Air Master," by Edward E. Chappelow, was very good. How about some more stories about the mad scientist? So good a scientist could not give up hope. Besides it would be practically impossible to make all the people in the world wear an iron hat.

W. HARRISON
Maspeth, L. I.

(Sequels to both "The Silent Destroyer" and "The Planet's Air Master" have come, the former, "The Sky Maniac," being in this issue and the latter to be in an issue of the near future.—*Editor.*)

Quality Versus Quantity?

Editor AIR WONDER STORIES:

As regards your new publication, AIR WONDER STORIES, I must say that it is great. It fills a needed place in the newsstands. In both issues to date I have found nothing to criticise except the number of stories in the August [illegible]. They were all so good that they offset that.

I look forward each month for Victor MacClure's "The Ark of the Covenant," which I think is the best story I have read for quite awhile.

SHELDON K. DAVIS,
Altoona, Pa.

(The [illegible] to reach is both quality and quantity. This is one we are approaching very quickly. It would be interesting to know whether our readers would prefer three long stories per issue or four or five, or even six, shorter ones.—*Editor.*)

(Continued on page 378)

See How Easy You Can Get... A Business of Your Own This New Way!

SEND your name and address for an amazing FREE book which gives facts that will surprise you about Modern Photography. It tells of an amazingly easy way to start your own business quickly, with very little capital. It also shows how hundreds of other men and women are making real money in spare time taking pictures.

Many Earn $35 to $90 a Week in Spare Time

In this day of pictures, photographers are making more than ever before. But just ordinary photography is not enough. In this book you are told how such men as Hughes of Kentucky made $97 in two days, how Sager of Pennsylvania earned $700 during spare time in a few months. Our method is so simple and easily grasped that you can make money even while learning.

Look into the new opportunities in Photography—and see why newspapers, magazines and photogravure sections use thousands of photos a month, and pay big prices for them. Business firms are constantly in the market for photos to be used in catalogs, booklets and advertising. Portrait work pays big.

FREE Book Tells How

Just mail the coupon for this FREE book. It explains how our thorough Course in Modern Professional Photography enables you to quickly learn this fascinating, profitable work in your own home.

It will pay you to discover the [illegible] that [illegible] in Modern Photography. [illegible] or [illegible] [illegible] [illegible]

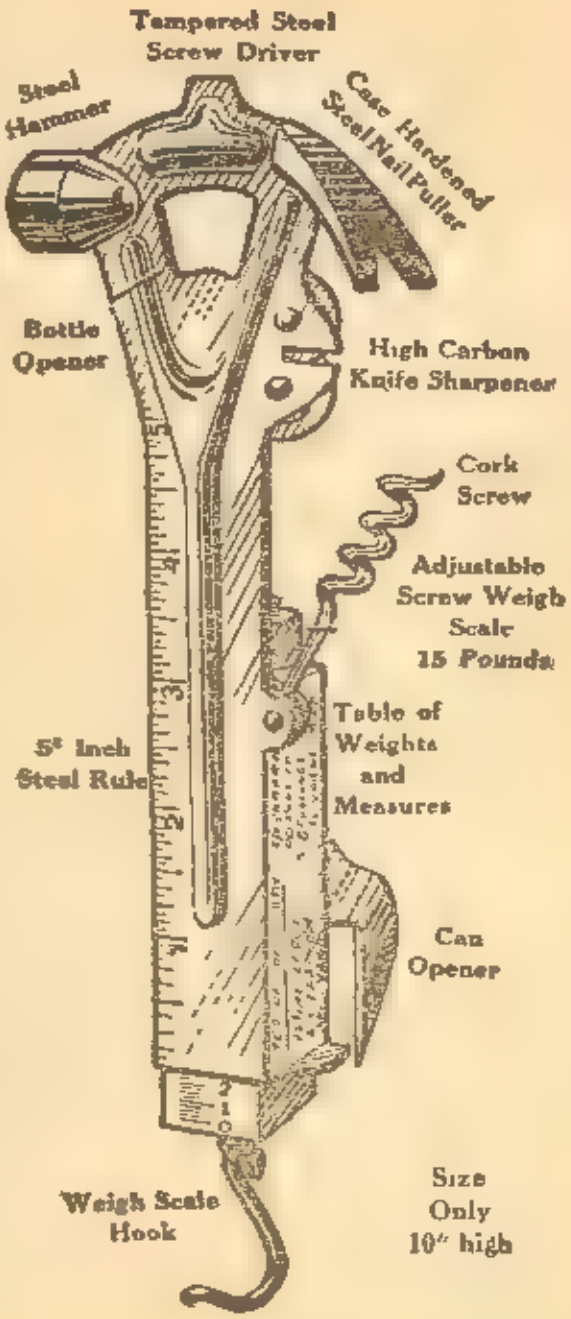
TEN TOOLS IN ONE

A SMALL but handy article which serves for every possible need of the all-round mechanic. Invaluable in any emergency.

An excellent combination of utilities for the household—every necessity featured: *Hammer — Knife-Sharpener — Nail-Puller — Bottle-Opener — Screw-Driver — Can-Opener — Weigh-Scale — Ruler — Table of Weights and Measures.* Just glance at the illustration and you will see how really useful this article is. The "Ten in One Tool" is 10 inches high and finely nickel plated.

The new tool is not only handy in the household, but every *Tourist, Autoist, Camper, Picnicker, Boy-Scout, Fisherman, Canoeist, etc.,* should carry in his bag one of these indispensable combination tools. No *Shop, Office, Store, Garage, Farm, Boat* should be without one. PRICE $1.00, POSTAGE PAID.

Be the first one to own the "*Ten Tools in One*" in your town. Send your order today, put a dollar bill to coupon below and the shipment will go forward to you the same day as received.



Grenpark Tool Co.

245 Greenwich Street

New York, N. Y.

GRENPARK TOOL COMPANY,
245 Greenwich Street, New York, N. Y

Enclosed find $1.00 for which please send me prepaid your "TEN TOOLS IN ONE."

A-10-29

Name .....

Address .....

Town..... State .....

Every Aviation Question Answered

By VICTOR W. PAGE'S AVIATION BOOKS

EVERYBODY'S AVIATION GUIDE

By MAJOR VICTOR W. PAGÉ

This practical, non-technical book is written especially for the aviation enthusiast. It is a mine of information tells all about the construction of airplanes and dirigibles and how they navigate the air.

Here you will find ten lessons logically arranged in question and answer form. Save your time—read the book—get the meat of the subject. It contains everything from elementary conceptions of mechanical flight and primitive forms of aircraft to a more advanced consideration of aerodynamic principles. 140 Illustrations, 256 Pages. Price, $2.00.

For Sale by

TECHNI-CRAFT PUBLISHING CORP.

98 Park Place New York, N. Y.

THE READER AIRS HIS VIEWS

(Continued from page 377)

Sequel to Planet's Air Master

Editor AIR WONDER STORIES:

I have just finished the 2nd issue of AIR WONDER STORIES. "The Planet's Air Master" was very good, see if Chappelow can be induced to write a sequel to it. "The Ark of the Covenant" continues to be a success with me. "The Silent Destroyer" was fair, tell Jane to put more interest in his stories. I must congratulate you upon your SCIENCE WONDER STORIES to which I am a subscriber. Keep up the good work.

EUGENE JACOB,
Brooklyn, N. Y.

(A sequel to the "Planet's Air Master" is already in our hands and will be used at an early date. The editors can promise that it is better than the original. Which is making a broad statement but one which will be proved. We again ask which is better, AIR WONDER or SCIENCE WONDER STORIES?—*Editor*)

A Classification

Editor AIR WONDER STORIES:

I have checked on the coupon below, the stories I like best in this issue and have listed them in order of my preference.

1. "Where Gravity Ends"
2. "Flight in 1999"
3. "The Air Terror"
4. "The Yellow Air Peril"
5. "The Ark of the Covenant"

Remarks and suggestions:

We wish your magazines (SCIENCE WONDER and AIR WONDER STORIES) great success.

HAROLD and HENRY THOMAS,
Sharon, Pa.

(This is the first set of opinions on the stories in the September issue, as we requested. Therefore we are printing it for our readers to comment on.—*Editor*)

Learns Aeronautics From Us

Editor AIR WONDER STORIES.

I have taken a great interest in your AIR WONDER STORIES magazine since you first placed it in circulation. I have read almost every air-fiction magazine on the newsstands, and I find that yours surpasses them all by far.

I will not attempt to criticize any of the science in your stories. I am too much of a novice for that. The printing is much more accurate than that found in most publications. Your "Aviation News of the Month" page is great. I have learned more of the real advances of aeronautics through your columns than I ever learned in years before. L. L. MILLER,
Albany, Ore.

(This letter from Mr. Miller is characteristic of those we get from aviation enthusiasts who never seemed able to get the fundamentals of aviation before. No doubt Mr. Miller will have been pleased with the "Aviation Forum" department started in the last issue. That is a continuance of our program to instruct as we entertain.—*Editor.*)

The Cover Question Again

Editor AIR WONDER STORIES:

I have been a very ardent reader of your publications for a long time and when one of them comes out I can't resist buying it immediately. In AIR WONDER STORIES for July and August were some peachy stories. Among these the "Ark of the Covenant" stands out as easily the best and most promising. "Islands in the Air" was good but seemed to be a bit far-fetched. "The Beacon of Airport Seven" and "Men with Wings" were both thrilling and eventful. Keller's "Bloodless War" was great.

In the August issue "The Ark of the Covenant" was up to its good standard. The rest of the stories were all I could wish for.

There again arises an ancient question. Why not put quiet colors on the cover? When I pass a newsstand the colors on your magazine yell at me, "Come here, here I am!" It may be good for advertising purposes but it doesn't appeal to me. Please put into your magazine stories of David Keller, Victor MacClure, Stanton Coblentz, J. P. Marshall and occasional new authors. Kindly put 100 pages into magazine instead of 95 or 96.

HAROLD APPLEBAUM,
Brooklyn, N. Y.

(The cover question seems to be one which is never destined to be settled. Letters pour into us from both sides. Some writers say "Don't change it at any cost" others like Mr. Applebaum say they are too colorful.

Covers are not made purposely colorful. The colors are adapted to the theme. If a colorful cover will render the theme better, make its message more apparent, then they are used. If somber shades are more fitting they are used.

Regarding the 100 pages, Mr. Applebaum surely realizes that the size of a magazine is governed by a great many factors. We have chosen the size and number of pages which best suits these factors. Surely he would rather have quality than quantity, especially when that quantity means only four extra pages.—*Editor.*)

THE READER AIRS HIS VIEWS

(Continued from page 376)

Mr. MacClure Sensible Looking

Editor AIR WONDER STORIES:

So far your magazine has been excellent. In the first issue I liked "The Beacon of Airport Seven" and "Islands in the Air" very [illegible] the first [illegible] I have read in any [illegible] Victor MacClure is the only [illegible] looking author we have.

[illegible] was by far the best. "The [illegible] Destroyer," "Beyond Gravity" and "The [illegible] Air Master" were all good. In the [illegible] issue "The Human Air Peril," "Where Gravity Ends" (this was too short) and "The Air Terror" were all good but "Flight in 1999" I did not like. I suppose I was frightened by Bob Olsen's picture. As I said before "The Ark of the Covenant" is the best of the lot. Print more like it. If not, reprint it.

LEONARD TRISDORFER,
Brooklyn, N. Y.

(We can't quite agree with the present writer that Mr. MacClure is the only sensible looking writer. We think that Mr Trisdorfer is influenced by the stories as much as by the looks of the authors. It is true that "The Ark of the Covenant" for all its inner thrill was outwardly a calm recital of stirring happenings. But we urge Mr. Trisdorfer to look [illegible] authors a little more closely. He will find them quite different than he imagines.—*Editor.*)

Promises That Don't Come True

Editor AIR WONDER STORIES:

I might as well chime in with my opinion of Air Wonder Stories since you so nicely invite me to. (See Vol 1, No. 3, Page 265.

I am very pleased with it, because while aviation forms the basis for the stories, they do not deal wholly with it, but give free rein to other subjects. Don't change your policy. Interstellar tales would not hurt the magazine if used occasionally.

Of your newer stories Miss Stone's "Men With Wings" takes the prize [illegible] any), while Bob Olsen's "Flight in 1999" follows, but you'll have to fly a long way before as good a tale as MacClure's "Ark of the [illegible] Wonder Stories, "The Human Termites" (of which I have read the first part) can't be beat. Dr. Keller is a fine writer.

Oh yes! In your other publication there is a story by a [illegible] "The [illegible] from [illegible] I was [illegible] that [illegible] I am [illegible] It was when he wrote "The Airborne [illegible]

[illegible] back on the [illegible] Air Wonder [illegible] and your Science Wonders, and you [illegible] and all other magazines for that matter, as to promising stories that [illegible] me at least, not for a long time. There is no sign of "The Robot Master" yet. [illegible] and many [illegible] youth, we don't [illegible] from that sail boat.

[illegible] the Forum and News of the [illegible] and I am highly [illegible] they can not be.

Don't put out a Quarterly (gosh! Do you want me to go broke. Really though one Quarterly is enough. You could put some air stories [illegible]

[illegible] I wish to say that H. G. Wells' "War in the Air" should positively be published in this magazine. And I think—yes, I know that even Poe's "Hans Pfaal" should also occupy some space. How about it?

LESTER ANDERSON,
Hayward, Cal.

(One must take account of editorial fervor in wishing to put 110 pages of stories in 96 pages of a magazine. But we agree that promising [illegible] Otherwise we are glad to get Mr Anderson's promised or threatened letter. We shall take his wish about interplanetary stories in Air Wonder Stories under advisement.—*Editor.*)

The Difficulties of Illustration

Editor AIR WONDER STORIES

I will just begin with lauding your incomparable Frank R. Paul. Before I begin, let me state that I am a loyal and constant reader of Science and Air Wonder Stories.

Paul is a marvel of his age. There is no story no matter how imaginatively written that he cannot illustrate. For sheer imagination he easily rivals and tops Jules Verne, H. G. Wells, Edgar Rice Burroughs, A. Merritt and Hugo Gernsback. It is one thing to be able to write a story, but it is quite another thing to illustrate the story *properly*. Paul does this and something more. He prints the pictures in such a marvelous way, that the author himself hasn't the power to foresee. It is one thing to say it in words but quite another to say it in pictures. I furthermore wish to add that the main reason why Science and Air Wonder Stories are so good and better than other magazines is because Paul is the illustrator of both Gernsback publications, while [illegible] and [illegible] I hope you [illegible] the [illegible] have been [illegible] and your [illegible] and Air Wonder [illegible]

Coming down to criticisms I wish to say that your stories in both magazines are very good. I have just started "The Silent Destroyer" in the second issue of Air Wonder Stories, and it starts off dandy. "Men With Wings" was good in the first issue, and so were the rest of the stories in the first issue except "The Ark of the Covenant," which took a small theme and padded it.

I liked the stories in Science Wonder Stories, especially the "Marble Virgin" by Kennie McDowd. It is not at all impossible according to the atomic weights of the different elements. Please publish Mr. McDowd's sequel.

"The Radium Pool" promises to be good, even better than Jack Williamson's story which I regret to say did not come up to my expectations in being as good as A. Merritt's "Moon Pool."

Now to get down to business. Will you please tell me if there was a certain John Worrell Keeley who lived in 1872? He professed to having discovered intra-atomic energy. He actually demonstrated his discovery to a group of the most noted physics, professors and engineers, using a thimbleful of water to derive the energy. But he died at the height of his power, with his secret undiscovered.

MORRIS KESSLER,
New York, N. Y.

(We can heartily echo Mr Kessler's praise of Frank Paul. We are surprised, however, that Mr. Kessler did not like "The Ark of the Covenant." This story was voted by the overwhelming majority of our readers to be one of the most marvelous air stories ever written. And on the contrary to it being a small theme we believe that as Mr. Kessler goes on he will find a theme so overwhelming powerful, and wide in scope that it will leave him breathless. We would like to get Mr. Kessler's opinion of the story after he has finally finished it.

The Keeley mentioned here is undoubtedly the inventor of the "Keeley motor," a perpetual motion device whose fallacies were exploded only after the man's death.—*Editor.*)

Wants Sequels

Editor AIR WONDER STORIES:

I have just finished my first two copies of Air Wonder Stories. Your magazine is a success beyond words. "Beyond Gravity," by Ed Earl Repp, was a good one. How about a sequel to that, proving a successful flight of the *Annihilator*. "The Silent Destroyer" was a good one, how about a sequel to it? The Ark of the Covenant," by Victor MacClure, is a scorcher; only Mr. MacClure forgot that there is a whole month between the installments.

A little suggestion. How about some stories of interplanetarian mail routes? Stick in some undefinable mystery caused by an unseen planet [illegible] The [illegible] of Airport Seven" by Hudo S[illegible] was a good one. [illegible] "Men With Wings" was a peach. Perhaps Harvey Britt had better study theogony. Again I say your magazine is a success.

C. W[illegible] Hiles,
McKeesport, Pa.

(Interplanetarian stories are not planned for Air Wonder Stories at present. A sequel to "The Planet's Air Master" is already in our hands and will be published shortly. We will see what we can do about the others. Mr. Britt may wish to enquire about this proposed story for him. If so, we offer him the freedom of our columns.—*Editor.*)

Which Is the Finest Science Magazine?

Editor, AIR WONDER STORIES:

Air Wonder Stories is the finest science magazine on the magazine market. I think [illegible] is one [illegible] we have [illegible] "The Planet's Air Master" and say that is the best story in the book. Of course, "The Silent Destroyer"; by Henrik D. Juve is also one fine story. I always knew some fine educators of science would put such a good magazine on the market. Wishing you success of your magazine.

JOHN RAMSEY,
Brooklyn, N. Y.

(If there is any dispute on Mr. Ramsey's description of Air Wonder Stories as the finest science magazine on the market it will come from Science Wonder Stories. But as we find they are both our loves we cannot answer Mr. Ramsey's statement either way. But we invite our unprejudiced readers to answer that. Which is better, Science Wonder Stories or Air Wonder Stories?—*Editor.*

CHEMISTRY

IF you are interested in chemistry, you will be pleased to hear that a magazine written in plain English, containing a vast amount of information for the beginner and the more advanced student in chemistry is being published now.

Chemical Experimenter

is a Monthly Magazine chock-full of interesting Departments, edited by men who know how to state worth-while facts.

There are Departments about *"Chemistry in the Home" — "History of Chemistry" — "Experiments in Chemistry" — "Biographies of Celebrated Chemists" — "Chemistry for the Beginner" — etc., etc.*

Send the coupon below and you will receive all information about this Magazine.

CHEMICAL INSTITUTE OF NEW YORK,
16 East 30th Street, New York. A.W 10

Gentlemen:
Please send me free of charge all information about
Chemical Experimenter

Name [illegible]
Address [illegible]
Town [illegible]

Ex Libris — Fine Bookplates

PROTECT YOUR BOOKS. Give your library the distinction of an individual bookplate, with [illegible] If you are [illegible] the select and out-of-the-ordinary, you will be charmed with our artistic Duo-tone Bookplates, reproducing old woodcuts and engravings, on antique-tint vellum paper. $2 up per hundred. Send 10c. for specimen and illustrated catalog of our unique new series.

ISKOR PRESS, Inc.
Art Department
286 Fifth Avenue New York

X-RAY

KATHOSCOPE, Pocket Detector, Everybody wants it.

See your best girl and all she's doing. No one knows, but you see everything. Periscope operates in all climates; lasts lifetime, ready for use. $1.00 cash with order for this wonderful instrument and 8 astonishing French pictures. KATHOS CO., P. O. Box 820 City Hall Post Office, Dept. AW, New York City

TO NEW READERS

A few copies of the July, August and September issues of

AIR WONDER STORIES

can still be had at the regular price of 25c. each. Send cash, stamps or money order to

AIR WONDER STORIES
98 Park Place New York, N. Y.

JUNKERS "BREMEN"

40" Wing Spread

Construction outfit for this beautiful model

SENT POSTPAID $8.50

We have supplied Stores, Schools, Clubs and Military Academies SINCE 1909. Our 56-page catalog contains 26 flying and exhibition models, and a most complete line of parts and supplies for model airplane BUILDERS.

All Parts for building Compressed Air Motors.
2-Cylinder Motor with Tank.....$ 8.25
4-Cylinder Motor with Tank..... 12.50

If your local dealer can't supply you, order direct from us.

CATALOG sent postpaid 10 CENTS.

U. S. MODEL AIRCRAFT CORP.
397K Bridge Street Brooklyn, N. Y.

Stop Using A Truss

STUART'S ADHESIF PLAPAO-PADS are entirely different—being mechanico-chemico applicators—made self-adhesive purposely to keep the muscle-tonic called "Plapao" continuously applied to the affected parts, and to minimize danger of slipping and painful friction. The fabric is soft as velvet, and being adhesive clings closely to the body without straps, buckles or springs. Easy to apply, comfortable, inexpensive.

Awarded Gold Medal

Awarded Grand Prix

For almost a quarter century stacks of sworn testimonials from many different countries report success—without delay from work. The epidermatic absorption of Plapao and the utilization of "plaster therapy" tend toward a natural process of recovery, *after which no further use for a truss.* Test of factor "PLAPAO" sent FREE Mail Coupon below TODAY—

Plapao Laboratories, Inc.
397 Stuart Bldg., St. Louis, Mo.

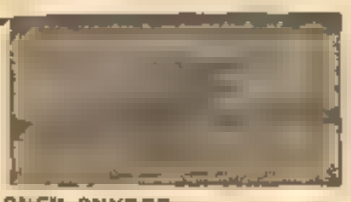
Gentlemen: Send me a Free Trial Plapao and 48-page book on Rupture. No charge for this now or later.

Name.....

Address.....

SPORTSTER

3 place monoplane, $1,600, with Le-[illegible] 80. Dlue-[illegible]



Descriptive Literature, 10c (stamps).

BARNEY SNYDER
Box 721 East San Diego, Calif.

SONG WRITERS!

Substantial Advance Royalties are paid on work found acceptable for publication. Anyone wishing to write either the words or music for songs may submit work for free examination and advice. *Past experience unnecessary.* New demand created by "Talking Pictures" fully described in our free book. Write for it Today—Newcomer Associates 751 Earle Building, New York, N. Y.

FOR $275 YOU CAN BUILD
The One-Place Universal Monoplane

[illegible] plans for anyone.

Descriptive folder, 10c. Designer's dope-sheet, 50c.

UNIVERSAL AIRCRAFT
1435 McPherson Ave. North Bend, Oregon

AVIATION NEWS OPERATION

(*Continued from page 370*)

Chamberlin Displays New Training Ship

CLARENCE CHAMBERLIN, the noted trans-Atlantic aviator, has devised a new type of training ship which was recently displayed. It is an open cockpit two-place ship, the two places being side by side in the cockpit. It has a Kinner five-cylinder 100-horsepower motor. By having everything open, the instructor is able to observe easily the manipulation of the student and thus turn the controls over to him at will. In a test race recently Chamberlin made a dive to earth from a two-thousand-foot level, making his landing in seventy-one seconds overall.

New Aerial Coast Defense to be Developed

AS an additional arm to the military equipment of the United States there will be developed an Aerial Coast Defense to protect our shores against the menace of bombing fleets in time of war. That the danger of a hostile air fleet invading our country and laying waste great cities is a real one is evident from the secrecy that attends the deliberations of a Senatorial Committee which is weighing the best means to establish this new arm. Both the Army and Navy claim the right to operate the Aerial Coast Defense and their claims are being weighed by the Committee. Senator Hiram Bingham, of Connecticut, who is president of the National Aeronautic Association, is chairman of the Committee.

Airplane in England Catches Popular Favor

DUE to the fact that the Prince of Wales now flies everywhere he goes, says the New York *Times*, the airplane is becoming fashionable in all classes of society and manufacturers are being swamped with orders. The impetus was also given by the sale of a new light family plane with a low, safe landing speed. Women and men alike are taking to the air as a sport and the London Aeroplane Club numbers now between 400 and 500 members. Train travel to and from resorts is giving way to travel by air.

Air Bumps as Real as Road's

A PERSON riding in a plane may expect the same bumps as if he were riding in an automobile, declared M. Luckiesh, of the General Electric Company, in *Aeronautics*. Due to the changes in wind intensity and direction, and the effect of rising and falling currents of air over certain areas, there are ready air bumps to be encountered in which the plane will suddenly rise or fall vertically for a short distance. A jar is felt due to the sudden deflection of air moving in a different direction from that of the general current. With the increasing spread of wings on planes these jars will become greater inasmuch as the wind will be able to operate on a greater leverage. This will cause suddenly a sideways tilt. If the current strikes the plane squarely, then will come the upward or downward bump.

Aviation Study of Country Planned

PARALLELING its study in 1913 of the automobile, the Curtis Publishing Company will make a detailed nation-wide study of the airplane, its future and how it can be used to advantage by business enterprises. A [illegible] will be used as [illegible] the [illegible] of the [illegible] will travel about the country. The plan [illegible] and will be conducted as an office. Mr. [illegible] Parlin who [illegible] 1,000 miles covering the [illegible] investigation will have charge of the [illegible]

Inexperience Causes Air Crashes, Says Commerce Official

THAT many of the recent air crashes can be laid [illegible] to the carelessness or inexperience of the pilot is the belief of Major Clarence Young, Director, Bureau of Aeronautics, Department of Commerce, writing in the New York *Times*. Another interesting angle of crashes comes from the [illegible] of Department of [illegible] regulations. In one case of a dual-controlled plane the rudder was struck by a passenger who had no right to be in the cockpit. Other pilots will crash from lack of fuel, due to carelessness in not ascertaining needs before leaving. The great majority of the accidents do not come in the regular air lanes of commercial transportation but in the miscellaneous flying. This, Major Young infers, shows that when planes are properly equipped and properly handled they are relatively safe.

The New
SEASIDE HOTEL
ATLANTIC CITY, N.J.

This Year You Will See The

New Seaside Hotel—

To meet the requirements of visitors to Atlantic City, we offer a new and greater Hotel, not merely in size, but in luxuriousness of conservative appointments, contributing to the convenience, comfort and pleasure of our guests.

We shall be glad to answer your inquiries and forward literature and rates upon request.

NEW in construction and furnishings

OLD in hospitable tradition

COOK'S SONS CORPORATION

450 Miles on a Gallon of Gas!

According to a recent article by the president of the world's largest motor research corporation there is enough energy in a gallon of gas[illegible] to run a four cylinder car 450 miles.

NEW GAS SAVING INVENTION ASTONISHES CAR OWNERS

A marvelous device [illegible] but [illegible] of the [illegible] and [illegible] of the ways of using [illegible] Although tests [illegible] Not only does it save [illegible] but it also creates more power [illegible] instant starting, quick pick up, and [illegible] carbon.

FREE SAMPLE and $100 a Week

To obtain national distribution quickly, men are [illegible] Free samples furnished to workers. Write today [illegible] for this free sample and big money making offer

WHIRLWIND MFG. CO.
999-41 E. Third St., Milwaukee, Wisc.

AVIATION NEWS OPERATION

(Continued from page 380)

Plane to Make Television Broadcast

C. FRANCIS JENKINS, noted inventor, will attempt a new form of communication this year when he will broadcast scenes of Washington from a plane through a television set. Experiments which Mr. Jenkins has made have convinced him of the feasibility of his project. The attempt will be made, as he says, before the actinic rays of the sun become too weak at the end of the summer, and the experiment will be for the benefit of television amateurs in the east. The scanning eye in the set is fixed in the floor of the cabin of the plane, will pick up the scenes and transmit them through the plane's radio set to the station at Rockville Station, Md., where they will be broadcast on a high power transmitter on a frequency of 2900 kilocycles.

Bellanca Doubts Commercial Value of Refueling

DESPITE the recent spectacular endurance flights made possible by refueling in the air, G. M. Bellanca, noted airplane designer, doubts the practicality of this for commercial service. He believes that it is not consonant with the highest possible safety which to him is the primary consideration. He does say, however, that the flights have great value as a means of educating the public to the possibilities of the airplane. Thus, those who fear to travel by air because of the possibility of motor failure are effectively silenced as the number of hours in the air continually runs up to unheard of values. And in most cases the pilots came down not because of the failure of the plane but rather because of climatic conditions or their own weariness.

The problem of safety, he says, can be best solved by making frequent stops to refuel and change pilots. The demands on a pilot are so great that he needs freshness and alertness. It is the human element that is the uncertain one in aviation at present. The life of the engine is also lengthened by frequent stops for examination and repair.

Montreal-Buenos Aires Non-Stop Route Seen

WITH the arrival in New York from Chile of a plane which made the trip in 10 days, plans are already afoot for a new Pan-American route which with refueling may make a trip as far as from Buenos Aires to Montreal without a stop, says Francis D. Walton in the New York *Herald-Tribune*.

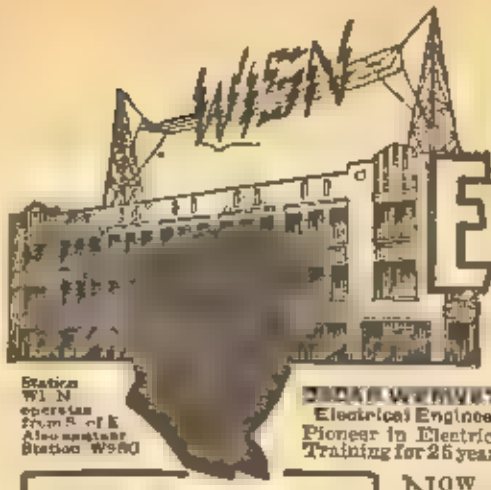
The possibility of extending the route so that it will cover 10,000 miles is now open and it merely waits for time before it will become an actuality. Six planes were used on the 7,200-mile trip and naturally opened the question of how the lost time consumed in changing the mail from one plane to another could be reduced. Since it is expected that the route will serve for regular passenger service as well as for mail and freight, safety is considered a prime requisite.

It is believed that by three refueling operations a plane could travel from Santiago to Miami. Furthermore, the endurance record recently established would permit twice the distance that would be covered in going from Santiago to New York.

Rockets Will Ultimately Be Successful

ROCKETS will ultimately be successful in their attempts to penetrate as yet unexplored parts of the universe, and give man a new speed vehicle far beyond anything he now has, is the expressed conclusion of H. H. Sheldon, Professor of Physics, New York University, writing in the New York *Herald-Tribune*. Commenting on the recent experiments of Professor Goddard of Clark University and Max Valier of Germany, Professor Sheldon sees them working on a sound principle. With the speeds obtainable it should be possible for a rocket plane to circle the earth in half a day or less. The rocket idea is not a new one, in fact it is 2,000 years old. Based on the idea that the reaction to the emission of highly compressed gases will propel a vehicle, speeds over 250 miles an hour have been made on a rocket sled. Its use on wheeled vehicles is limited because of the inability of the wheels to turn fast enough, but on planes its use is ideal. It can rise to high altitudes where the air is rarefied and here, unlike a propeller plane, its efficiency is greatest. Although man may not quickly reach the moon, Professor Sheldon concludes, he will get much higher than he has ever done before and the meteorological information that he will gain will richly compensate him.

(Continued on page 382)



Station WIBN operates from S. of R. Aboukir at Station WSBO

NOW I will train YOU for BIG PAY in ELECTRICITY

RIGHT IN YOUR OWN HOME!

Just As I Have Trained Over 25,000 Graduates In My Great ELECTRICAL SCHOOL!

EDGAR WERMUTH
Electrical Engineer
Pioneer in Electrical Training for 26 years.

BIG HOME LABORATORY Without Extra Cost

Full sized laboratory equipment (Not toys) that you can't duplicate for $60.

SPECIAL PATENTED Laboratory Equipment

that cannot be secured elsewhere. Makes fascinating sport of laboratory experiments. Amazingly easy to use.

LEARN BY DOING

Work on actual motor switchboard, circuits and full sized electrical equipment. Get Training that is PRACTICAL.

NOW through my Extension Division, I will train you for advancement and MORE PAY in Electricity without your leaving your home! You will get the same course, the same methods, the same faculty of skilled engineers that have made The School of Engineering internationally famous.

Behind your training will be an institution specializing in Electricity—a fully established college recognized by the U. S. Govt. Thousands of S. of E. graduates now employed in important positions with largest concerns in the country.

ELECTRICALLY TRAINED MEN Earn $3,000 to $10,000 a Year

In Radio, Television, Aviation, Automotives, Refrigeration, Moving Pictures, Super Power, Lighting, Electricity is the key. Big manufacturers are paying for men trained in Practical Electricity. Salaries of $3,000 to $10,000 a year now are common. Here is a vast field for you with unlimited opportunities. Now is the time to Start on the road of Electrical Training that leads to bigger pay, bigger opportunities—and SUCCESS!

EARN AS YOU LEARN

Cash in on your Electrical Training while you're learning. Many students report increased earnings and advancement even while studying. Train in your spare time at home. Employment Service renders FREE aid for Life. Lifetime Consultation Service. Many exclusive features available nowhere else. Mail the coupon today for full particulars.

FREE!

Send Coupon TODAY for fully illustrated Catalog, "Practical Electricity—the Key to Success" and full details of Extension Division Training.

MAIL COUPON NOW!

Extension Division, Dept. 61
SCHOOL OF ENGINEERING
Milwaukee, Wisconsin

Please send me without obligation FREE illustrated catalog, "Practical Electricity—the Key to Success" and details of Extension Division Training.

Name .....

Address .....

EXTENSION DIVISION
SCHOOL OF ENGINEERING
Dept. 61 Milwaukee, Wis.

LEARN CHEMISTRY

Dr. Sloane Will Teach You In Your Own Home

Chemistry offers those who are ambitious and willing to apply themselves conscientiously the greatest opportunities of any vocation. Industrial firms of all kinds pay tempting salaries to get the right men. No profession offers such opportunities and the next ten years are going to show the greatest development in this science that this country has ever seen.

T. O'Conor Sloane A.B., A.M., LL.D., Ph.D.

You Can Learn at Home

Our home study course, written by Dr. Sloane himself, is practical and remarkably simple. It is illustrated by so many experiments that anyone, no matter how little education he may have, can thoroughly understand every lesson. Dr. Sloane will give you individual help besides.

You do not have to have even the small price of the course to start. You can pay for it in small monthly amounts or earn it as many others are doing. The cost is very low, and includes even the Chemistry outfit—there are no extras to buy with our course.

Experimental Equipment Given to Every Student

We give to every student without additional charge the complete chemical equipment illustrated.

Tuition Price Reduced

Besides furnishing the student with his Experimental Equipment, we have been able, through the big increase in our student body, to reduce the cost of the course. Write today for full information and free book, "Opportunities for Chemists."

Mail the Coupon NOW

CHEMICAL INSTITUTE of NEW YORK, Inc.

CHEMICAL INSTITUTE OF NEW YORK,
Home Extension Division O,
16 18-A E. 30th Street New York City

Please send me at once, without any obligation on my part, your free Book, "Opportunities for Chemists," and full particulars about the Experimental Equipment given to every student. Also please tell me about your plan of payment and the reduction in the tuition price.

NAME .....

ADDRESS .....

CITY ..... STATE .....

AW 10-29

Science Wonder Stories

the wonders of modern science in fiction —

MECHANICS DRAMATIZED!

Big Magazine

Size 9x12"

4-Color Cover
100 Pages

25c
THE COPY

On All Newsstands

ONCE you have read your first science fiction story magazine, you will never let a month pass by without making every effort to read the next issue.

Hours of pleasant pastime are well spent in reading stories that you like—stories that are educational and entertaining—written by men with great imaginations. You will find creative ideas that touch beyond the world of human civilization, gripping revelations of interplanetary trips, discourses on transmutation of the elements, and the operation of machine men by perfected mechanisms.

Each month in SCIENCE WONDER STORIES you will read stories of this nature—blended with interest of human appeal and the endeavors of man to conquer the super powers.

Begin with the October issue of SCIENCE WONDER STORIES and you will find a new delight in future reading.

[Special Subscription Price--8 Issues $1.00]

STELLAR PUBLISHING CORPORATION,
Dept. A-10, 98 Park Place, New York, N. Y.

Enclosed please find $1.00 for which send me the next eight issues of SCIENCE WONDER STORIES.

Name .....

Address .....

City ..... State .....

AVIATION NEWS GENERAL

(*Continued from page 381*)

Deaths in Naval Plane Crashes Costly

AN estimate of $200,000 was placed as the cost to the government of a fatal crash of a navy plane in which a naval aviator is killed. This statement was made by Lieutenant Carl B. Harper in the *Journal of the Society of Automotive Engineers*. For there is lost to the government not only the expense in training the aviator, the loss of the plane, but also the pension paid to his family. Commenting on planes used for the Navy, Lieut. Harper approved of the automatic stabilizing slot. Planes equipped with them when put into a spin, recovered from it very quickly when the slots were opened.

Noctovisor to Pierce Fog Two Miles

A DEVICE called the *noctovisor* has been invented by John L. Baird, television inventor, which he claims can pierce a fog for two miles. In a recent experiment an automobile headlight three miles away was covered with a sheet of *ebonite* whose opaqueness corresponded to a fog and the machine picked up the headlight and amplified it on its receiver. The apparatus is a combination camera lens and television transmitter and receiver. The "eye" of the machine picks up the light, sends it to the exploring disk of the transmitter from which it goes to a photoelectric cell and then to the receiver where it is amplified. The device is expected to be used on ships at sea and on planes where in the latter case its use would be invaluable to pick up beacons which can therefore give a lost plane its direction and possibly an idea of its altitude.

Future of Aviation Is Limitless Says Fokker

ANTHONY FOKKER, noted airplane designer and builder, writing in the New York *American* sees the future of aviation as almost limitless. He believes he speaks modestly, too, for his last predictions have been exceeded two or three times. The total production of planes five years hence should exceed 150,000 a year, he believes. He has recently tied up his fortunes with the General Motors Company in order to take the advantage of greater capital and the research opportunities afforded. He does not believe that the future of aviation lies solely in the big transport planes. Soon there will come an enormous demand from the public to fly and fly solo. He thinks on the contrary that some of the planes, for example the 100-passenger ships, that are being built are so large that they are becoming inefficient. They will find, he says, that the larger airplanes are made the greater the weight element becomes and the greater the cost for handling and operating.

Publisher Proposes National Air Academy

BELIEVING that an effective air force will only come through centralized direction and training, *Aeronautics* has come out editorially in favor of a National Air Academy comparable to West Point and Annapolis. The present situation of having aeronautic efforts of the government dissipated in six or seven different departments is characterized as a "hodge-podge." The magazine feels that government expenditures on aircraft, equipment and the training of men who know aviation thoroughly will make a greater return than similar sums spent on the regular army and navy establishments. "A fighting service and a school of the kind we propose," the magazine says, "would place America forever secure from the encroachments of enemies and those potential enemies who find the payment of their debts increasingly onerous."

Lindbergh Beacon to be World's Largest

AN aerial beacon with a range of 7,000 miles into space, to be known as the Lindbergh Beacon will be erected in Chicago atop the new Palmolive Building. With an estimated power of 2,000,000,000 candle-power the beacon will be the most searching in the world, only the curvature of the earth's surface, it is said will limit its range. It will have a 150,000 ampere high intensity arc and will revolve three times a minute therefore indicating Chicago to all points of the compass. It will be located about 20 miles from Chicago's municipal airport. Inasmuch as there might be conflict in beacons, some of which are for illumination of air routes and others merely for advertising it was necessary to get the permission of the Department of Commerce through the recommendation of the Chicago Aero Commission before the beacon could be approved.

Every Aviation Question Answered

By VICTOR W. PAGE'S AVIATION BOOKS

MODERN AIRCRAFT

Design, Construction, Operation and Repair

By MAJOR VICTOR W. PAGÉ

This book is written in simple language for the practical man. It shows just how an airplane flies and is controlled, outlines and describes all important parts of the plane and just what they do and how they are used. Covers the commercial possibilities of aircraft types, outlines their spheres of usefulness and considers the cost of flying. The equipment of airports, airways and landing fields is touched upon, and a complete and easily understood explanation of all branches of aerodynamics as well as a complete glossary of terms used in aeronautics are included.

400 Illustrations, 855 Pages. Price, $5.00

For Sale by

TECHNI-CRAFT PUBLISHING CORP.
98 Park Place, New York, N. Y.

AGENTS WANTED

FREE BOOK. Start little mail order business. Hadwil, 27A-74 Cortlandt Street, New York.

Get our Free Sample Case—Toilet Articles, Flavorings, Soaps, Specialties. Wonderfully profitable. LaDerma Co., Dept. SC, St. Louis, Mo.

AGENTS: Be a thousand miles ahead competition. Patented product housewives want. Commission in advance if wanted. Comptroller, Box 929, New Orleans, La.

BOYS OR GIRLS—any boy or girl can earn pocket money selling Vi-Bo Liver Tablets for us. Particulars free. Gomex Laboratory, 4235 South Liberty Street, New Orleans, La.

CHEMICALS

BOOKLET OF EXPERIMENTS and chemical catalog, 15c. General Chemical Company, Box 397, Reading, Penna.

DETECTIVES

DETECTIVES Earn Big Money. Excellent opportunity. Experience unnecessary. Particulars Free. Write, George Wagner, 2190B Broadway, N. Y.

INSTRUCTION

I CATCH from 45 to 50 foxes in from 4 to 5 weeks' time. Can teach any reader of this magazine how to get them. Write for particulars. W. A. Hadley, Stanstead, Que.

MISCELLANEOUS

TOBACCO OR SNUFF HABIT Cured or No Pay. $1.50 if cured. Remedy sent on trial. Superba Co., T28, Baltimore, Md.

KILL RATS AND MICE. Destroy Roaches. Products guaranteed. $1.00 each plus transportation. Ace Company, 824 Park Avenue, Weehawken, N. J.

SONG POEM WRITERS

SONG POEM WRITERS. Melodies written and arranged for publication. Write, Ernest Shonfield, 2236 Olive Ave., Pasadena, Calif.

SONG POEM WRITERS—"Real" proposition. Hibbeler, D153X, 2104 N. Keystone, Chicago.

BOOK REVIEWS

INTERNATIONAL AIRPORTS, by Stedman S. Hanks, 195 pages, stiff cloth covers; illustrated; 5½ x 8½. Published by The Ronald Press Company, New York. Price $5.00.

In the confusion of newspaper headlines on the growth of aviation with its spectacular feats, one must not lose sight of what lies behind the scenes. More than one aviation expert has said that the progress of commercial aviation will depend roughly on the growth of airport facilities and the solution of airport problems.

Lieut. Colonel Stedman S. Hanks, of the Air Corps Reserve, in this book has written a general summary of the airport situation both here and abroad, making a study of the facilities employed and the experiences of the great airports of the world.

His knowledge of the international airports was gathered in a personal tour of Europe and other foreign ports. From the study of each port he has garnered a new idea in airport design and management and has presented his conclusions in the form of a composite airport which embodies the best features of all of them.

Colonel Hanks notes with regret that, unlike the Europeans, we have not been as careful in the appearance of our airport buildings as we have been in their utility. Therefore, he says, "many of our structures look more like factory buildings rather than passenger terminals." He notes also that we have lagged behind Europeans in the development of the flying boat. This craft is considered necessary for all routes that pass over a comparatively large stretch of water. His observation that Italy surpasses us in the flying boat should perhaps be qaulified by the realization that, surrounded as it is on three sides by water, Italy has greater need of the flying boat than we.

However, we are in the lead in night flying. The reason there too is one of local consequence for the distances traversed in Europe, at least, do not require night traveling to the same extent.

An interesting chapter in the book deals with communication as it is applicable to aviation. The radio telephone, and telegraph are both discussed as being important links in the vital communication between port and port and port and plane.

Too little attention has been paid to the airport. Too many cities desirous of attracting air traffic have built flimsy, unattractive, ill-designed airports.

They would do well to draw a moral from the progress of the leading railroads of the country, who have found it profitable to tear down their unsightly, antique stations and build structures of dignity and comfort.

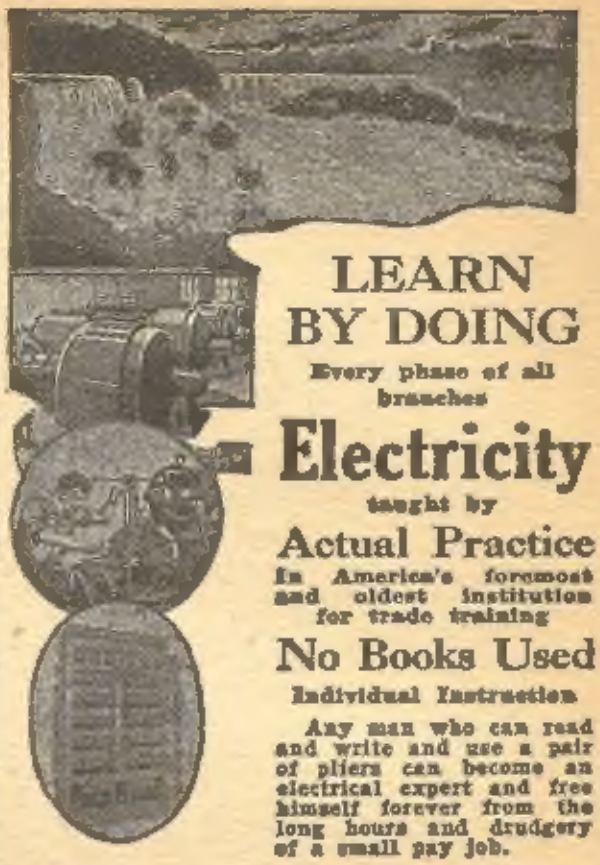
Airport engineers, students, shippers of goods by plane and even amateur aviators would do well to read this book. Anyone taking aviation seriously and lacking a knowledge of airports may be likened to the "skipper who knows not of ports and havens."

AERIAL NAVIGATION AND METEOROLOGY, by Captain Lewis A. Yancey, 316 pages, illustrated, stiff cloth covers, size 9 x 5¾. Published by Norman W. Henley Publishing Company. Price $4.00.

This book is by one of the recent trans-Atlantic flyers. Captain Yancey is listed as a Master Mariner, Marine Surveyor, and Nautical Counsellor. With his experience in marine navigation and his aerial training, it would seem that he is admirably equipped to write on the field of aerial navigation. It is a subject that is not yet probed extensively. The technique of traveling by air is still in its infancy, and before the aviation industry can claim for itself a recognition as a stable means of transporting peoples and things in large quantities, it must develop a great corps of men who understand the air as well as mariners know the sea.

Captain Yancey's book is divided into eleven parts. Beginning with a study of the means of determining bearing and direction, he leads his reader through an understanding of our earth and its nautical division, and an understanding of the reading of maps and charts. The compass is dealt with fully as to its use, the determination of compass errors and the correction of courses. Meteorology receives serious treatment so that the aviator can acquire an understanding of the phenomena of fogs and storms. Air Commerce Regulations, the Bible of all interstate aviation traffic, forms the last chapter in the book.

To anyone contemplating a serious entry in the field of aviation transport this book is warmly recommended. It covers the subject of navigation in a clear understandable fashion, written for the person of no more than average education. Even amateur aviators who wish to acquire the added proficiency in flying that may well mean the difference, in an emergency, between safety and disaster, will find a perusal of this book and the learning of its principles time well spent.



LEARN BY DOING

Every phase of all branches

Electricity

taught by

Actual Practice

In America's foremost and oldest institution for trade training

No Books Used

Individual Instruction

Any man who can read and write and use a pair of pliers can become an electrical expert and free himself forever from the long hours and drudgery of a small pay job.

ELECTRICITY

The Lifeblood of America's Industrial Expansion

And you can learn the BIG PAY profession of electricity right in New York City—the heart of the electrical world—the city of 100,000 jobs. At the same time you are learning the BIG PAY profession you can be enjoying the sights and wonders of New York, the modern Bagdad.

Be an Electrical Expert

Graduates of the NEW YORK ELECTRICAL SCHOOL are in demand by all the big electrical companies. Or, if you prefer the independence of a business of your own, there are thousands of opportunities for efficient, dependable men to become electrical contractors. When you are your own boss the money you can make is limited only by your own energy and ability.

Personal Instruction

The NEW YORK ELECTRICAL SCHOOL is not a correspondence school. You learn by doing—by personal instruction on full size standard electrical equipment under the personal supervision of trained instructors.

At N. Y. E. S. you train your hands and mind at the same time. You learn the theories of electricity—and then you are shown how to put the theories into actual practice by solving the problems with your own hands.

The man who has learned electricity by actually doing electrical work under intelligent personal instructors can go to any part of the world and be sure of a good living. There are N. Y. E. S. Graduates in all the countries of the world.

Write today for the 48-page booklet giving full information about the N. Y. E. S. Course and showing pictures of the equipment available for your personal use in our two seven-story buildings.

New York Electrical School

21 N.Y.E.S. Bldg., 17th Street, New York

MAIL TODAY

THE NEW YORK ELECTRICAL SCHOOL,
21 N.Y.E.S. Bldg., 17th Street, New York.

Please send me FREE your 48-page booklet. It is understood that this request puts me under no obligation.

Name .....

Address .....

.....

The Latest—The Best—The Lowest Priced!

For 25 years the management of this firm has sold merchandise by mail. This is our guarantee to you—
"We promise courteous treatment and prompt shipments."

Order Direct From this Page

WE PREPAY ALL ORDERS ABOVE 50 CENTS.
(Remit Five Cents extra postage for all orders below 50c)

Money Refunded If Goods Unsatisfactory

Remit by check, money order or U. S. Postage stamps. Canadian and foreign stamps not accepted.

REAL PISTOL

Here's a real pistol, yet small enough to be used as a watch charm. Illustration is full size. Imported, best European workmanship. Excellent reproduction of standard pistol. Cut shows pistol broken open to load blank cartridge. When trigger is pulled, cartridge goes off with a loud BANG, that can be heard for a block. Pistol entirely made of steel, nickel plated. Handle is beautifully engraved. Octagonal barrel. Comes in box, with cleaning rod and 25 blank cartridge, AT NO EXTRA CHARGE. (As explosives are prohibited to go by mail, pistol is sent express collect).

No. 8509 Pistol $1.20
No. 8509A Set of 25 Cartridges, by exp. collect .25

LUMINOUS PAINT

Make your own luminous articles. Paint watch and clock hands, electric light switches, push buttons, keyholes, house numbers, etc. 1,000 uses. Articles treated stand out brilliantly in dark. The darker the room, the more brilliancy.

No. 8508-A
Prepaid 25c
No. 8508 Luminous Paint Large Size $1.00

MAGNIFIER

This fine folding pocket magnifying glass, also called linen tester, is made entirely of gold lacquer brass. Has powerful lens that magnifies everything 10 times. Has fixed focus. Just open it and it is ready. When folded this magnifier occupies a space about as large as a quarter and twice as thick.

No. 8516 Magnifier
Prepaid 35c

MICROSCOPE

Here is a real high power imported microscope for instruction and laboratory work. Has regulation rotating light mirror. Has adjustable lens for correct focusing. With it come 3 specimen slides. Entirely brass. Packed in neat leatherette box.

No. 8517 Microscope
Prepaid $1.90

FLOROSCOPE

This is a fine imported combination microscope. Really two instruments in one. One end used for high magnification, such as seeing bacteria in milk or water. Other end to see parts of insects, flower specimens, etc. Finished in gold brass.

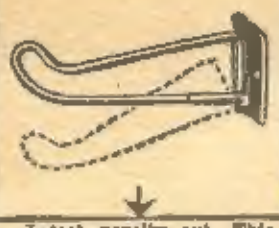
No. 8518 Florescope
Prepaid 65c

FOOLEM

Box of sponge rubber cigarettes. Can't be told apart when mixed with real ones. Get the laugh on your friends. Nothing like it. This is one of the cleverest novelties ever designed and is made exceedingly well. Even the ends of the cigarette look like real tobacco.

No. 8504 Cigarettes
Prepaid. Box 25c

HOAX HANGER



Latest novelty out. This trick coat-hanger looks just like the regulation article. But try and hang a coat on it and—FLOP down it comes. Hanger has a spring hinge—even a hat pulls it down. Hanger is fastened to wall with nails or screws. Nickel plated.

No. 8523 Hoax Hanger
Prepaid 25c

10¢ COMPASS 10¢

Fine imported magnetic compass. ACCURATE. Pocket size. Invaluable for hikers, automobilists. Often saves lives. Use it to tell live electric wires; make your own galvanoscope. Fully nickel plated. The actual article is about one-half again as large as illustration shown.

No. 8507 Compass
Prepaid 10c

RUBBER!!

Cigar is made of sponge rubber. Fools everybody. Deception is perfect.

No. 8506 Rubber Cigar
Prepaid 15c.

Offer your friends or your girl some chewing gum—They try to chew it, till they find out its rubber! Five sticks to the packet

No. 8519 Rubbergum
Prepaid 10c

BOOTLEG PUZZLE

A real sticker. Just try and get the bottle off the boot. It will take you quite a while till you master the intricacies of this clever puzzle. Made entirely of metal. Nickel plated. Size of this puzzle is 3½"x2¾".

No. 8515 Bootleg Puzzle. Prepaid 20c

TRICK-SOAP

Loads of fun with this trick soap. Looks harmless and is intended to "get" the chap who always uses your soap. When he uses it his hands get black as soot and he needs real soap to clean his hands.

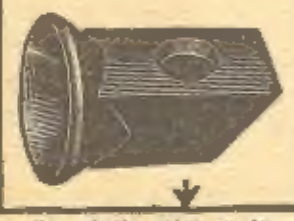
No. 8512 Trick Soap
Prepaid 15c

BLUFFGUN

Bluff your friends with this gun. Made of composition metal handsomely nickeled. Exactly same size, weight and shape as real article. Fine to bluff burglars. Used also as desk paper weight. Size of this gun is 6¼" long and 2" wide.

No. 8505 Bluffgun
Prepaid 60c

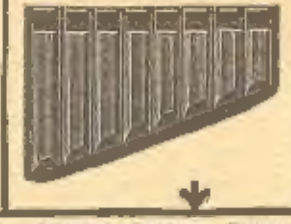
PERISCOPE



See what's going on behind your back with this Seebackoscope. Used like a magnifying glass. No one knows you're watching them. Gives you "eyes in your back." This article is made in molded bakelite and its size is 2"x1½".

No. 8506 Periscope
Prepaid 10c

CALLIOPE



Musical Calliope. Latest novelty. Made in celluloid, light weight. 4½"x3". Eight keynotes produce perfect Calliope musical effect. Simple to play—just blow. Plays like Harmonica. Exceptionally loud. Finished in different, attractive colors.

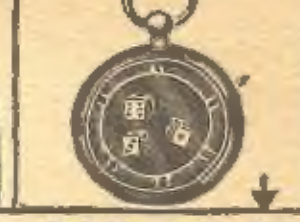
No. 8521 Calliope
Prepaid 15c

NOSE BLOWER

The real article! Conceal nose blower in your handkerchief and blow into instrument while you pretend to blow your nose. Everyone stops and looks at you. There never was a terrible noise like it. Keep it up as long as you like.

No. 8510 Noseblower
Prepaid 10c

DICE GAME



Real Dice game. Press lever on side. When released, dice spin around on green cloth. Smallest game of its kind. Built ruggedly. Same size as your watch. Full nickel finish. Glass crystal. Has a ring to attach to your watch chain.

No. 8514 Dice Game
Prepaid 45c

ROULETTE

Real roulette game. Press lever and arrow spins around. Never stops twice on same number in succession. Same size as your watch. Fully nickel plated, glass crystal. Loads of fun. Has a ring to attach to your watch chain.

No. 8513 Roulette Game. Prepaid 45c

OOH-LA-LA RING

Handsomely carved gold filled ring. Looks just like any other ring. But, oh boy, wait till you look through the "VIEW." Strong magnifying glass shows French actress when viewed against light. Ring has large imitation diamond. When ordering enclose a strip of paper giving size of your finger.

No. 8511 Surprise Ring. Prepaid 35c

TELEGRAPH CODES

NEW!! Telegraph 25c

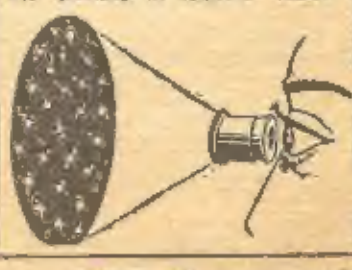
For the astonishing small sum of 25c you can now learn telegraphy. Any wide awake boy or girl can learn the telegraph codes with this little outfit within from 30 to 60 days. Gives loud signals perfectly — nothing to wear out. No batteries. The instrument consists of hard fiber base, mechanical sounder and telegraph key knob. Screw to table or carry it in pocket. Guaranteed to give exact reproduction of telegraph sounds just like regulation sets. We also furnish free a set of telegraph codes as shown, and full instructions of how to learn telegraphy.

No. 8525
Telegraph Set
Prepaid 25c

NEW!! Spinthariscope

Positively the most astounding scientific instrument ever developed. This instrument formerly sold from $1.00 to $50.00 upwards. Now it is possible to get it for a small sum. Witness actual destruction of thousands of Worlds by simply looking through the lens of the instrument. Actual radium is disintegrated before your eyes. You see the atomic bombardment plainly. Instrument is guaranteed to contain a minute quantity of radium. There is no more enthralling sight in the whole world than what you see in the Spinthariscope.

Nothing to wear out. Lasts forever. Adjust by extending lens to right focus and watch the spectacle.



No. 8524
Spinthariscope
Prepaid 65c

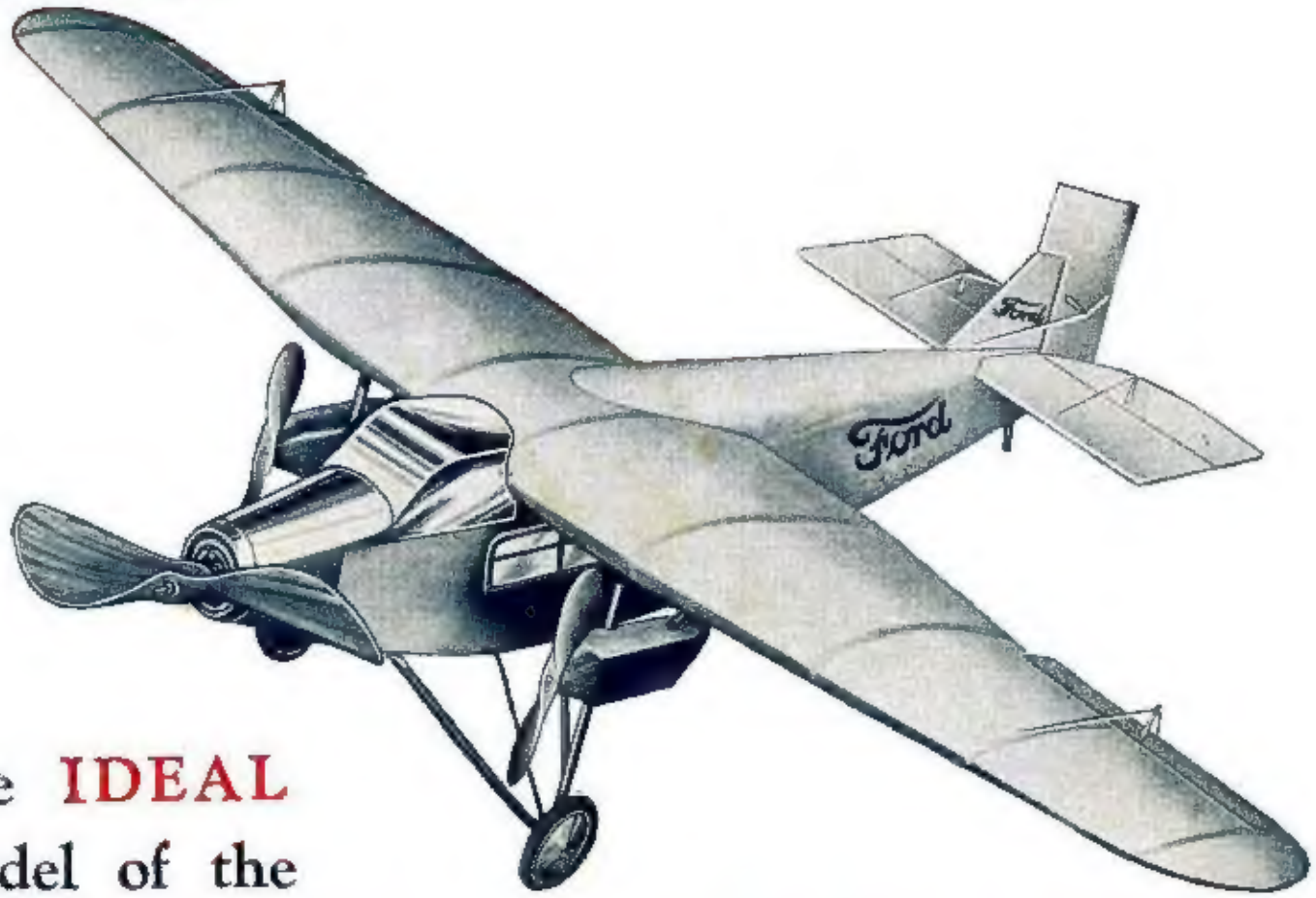
CIGARETBANG

Here box is THE novelty. Box contains a dozen tiny wood pegs—but they ARE "treated." Push the sharp end of peg into cigarette about 1/3 in. Pegs are so small they're invisible. Then offer your friends the cigarettes. BANG, BANG! they go off — Yet ENTIRELY HARMLESS.

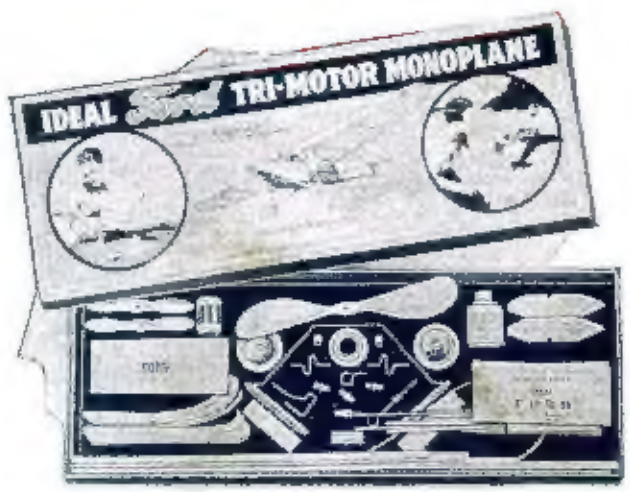
No. 8320 Cigaretbang. Prepaid 15c

SCIENTIFIC NOVELTY COMPANY, 245 Greenwich St., New York City

Build and Fly Your Model Airplane the IDEAL Way!



The IDEAL Model of the FORD TRI-MOTOR MONOPLANE



A PERFECT Model; made from the original specifications furnished by the Stout Airplane Co., a Division of The Ford Motor Company; of the "FLOYD BENNETT," the tri-motored Ford Monoplane now in service in the Antarctic with Commander Byrd.

SPECIFICATIONS:

Wing Span: 36 in.	Wing Chord: 7 in.
Length: 27 in.	Weight: 10¾ oz.
Speed: 27 m.p.h.	Wing Loading: 13 oz.

Has all the distinctive features of the original and the most perfect copy possible to make in model form. Build it the IDEAL way; the most practical way to build models of real Airplanes.

Complete Construction Outfit (shown at the left) contains everything required, including Plans, Diagrams, Patterns and Build-Flying Directions. Price.....$8.50

Ask your dealer for this Model; if unobtainable, order direct from us. See catalog below for models of "Spirit of St. Louis," FOKKER, DeHavilland, Curtiss and other Aircraft.

IDEAL Construction Outfits Build True Copies of Real Airplanes!

These Outfits make building easy. All wood parts are cut to size, ribs ready formed, propellers fully carved from hard wood (no breakable balsa used), all metal fittings strong and ready for use. Accurate Plans, also Diagrams and Patterns, included with each outfit. Build your Model Airplane the IDEAL way—then you will have a stronger, more realistic Model.

IDEAL AEROPLANE & SUPPLY COMPANY, Inc.

Model Airplane Headquarters for 18 Years

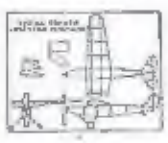
20-22 West 19th Street **New York City**

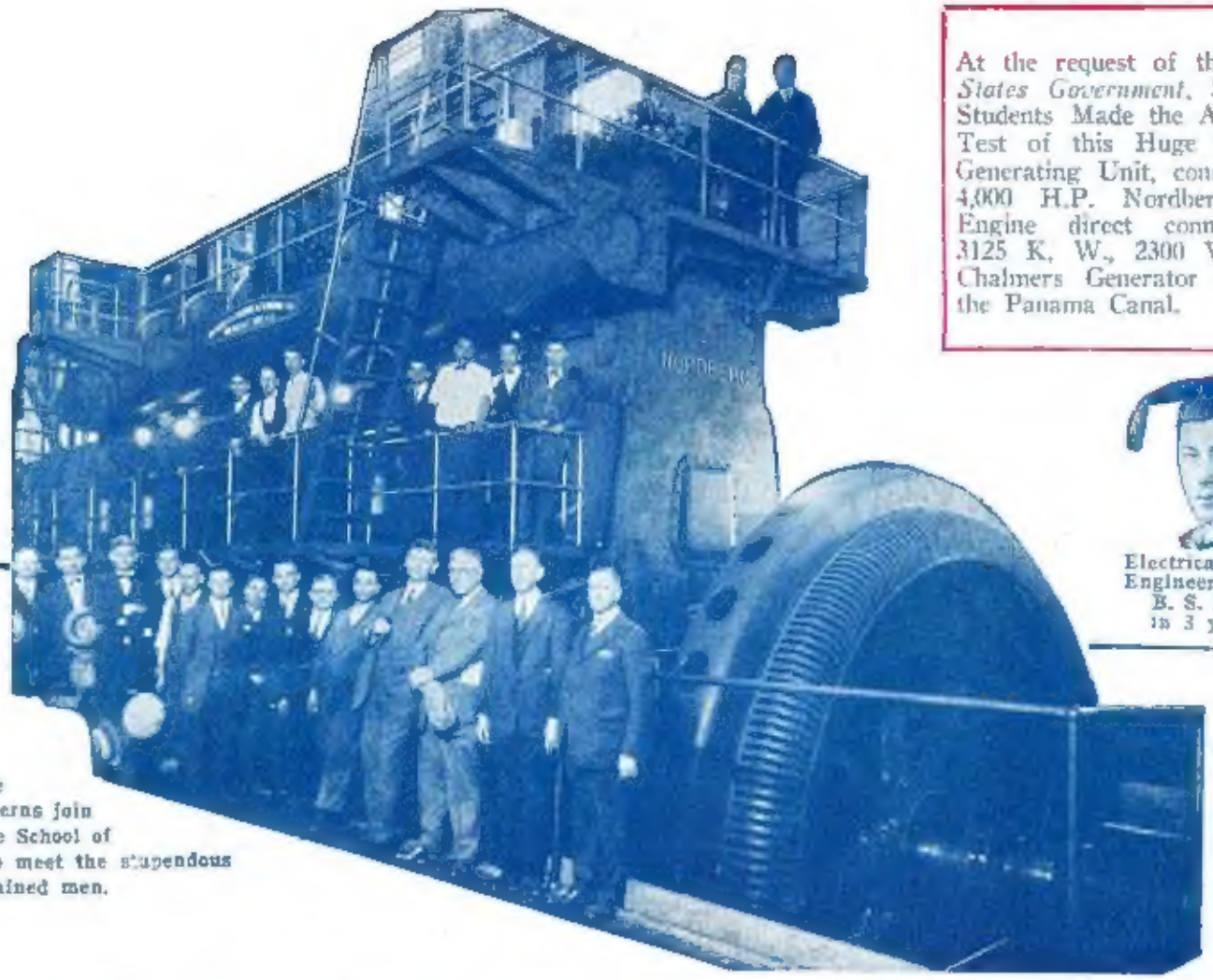
64-page Catalog—5c

Tells how to build Gliders and Racers, gives full information about Scale Models, and contains most complete listing of Parts, Fittings, Materials and Supplies for all kinds of model aircraft. The biggest and best Model Airplane catalog obtainable.

Plans for Models—25c

Complete Plans and Instructions for any one of the following Models sent for 25c; New York-Paris (Spirit of St. Louis); FOKKER; DeHavilland; Curtiss; NC-4 Seaplane; Blerlot, Taube or Nieuport Monoplanes; Cecil Peoli Racing Airplane. Catalog included free.





Big Milwaukee electrical concerns join hands with the School of Engineering to meet the stupendous demand for trained men.

At the request of the *United States Government*, S. of E. Students Made the Acceptance Test of this Huge Electrical Generating Unit, consisting of 4,000 H.P. Nordberg Diesel Engine direct connected to 3125 K. W., 2300 Volt Allis Chalmers Generator built for the Panama Canal.

Electrical Engineering, B. S. Degree in 3 years

Men of Action WANTED FOR Commercial Electrical Engineering

TAKES you out of the class of the common laborer of which there is always an over-plentiful supply at cheap rates of pay. Makes you a **Graduate Electrician, Junior Electrical Engineer,** or **Commercial Electrical Engineer** in 12 short months. Puts you in line for a job where big manufacturers are actually pleading for trained men and glad to pay **Big Salaries** ranging from $2,000 to $10,000 a year. Not a dream—**A DEAD SURE FACT!** For 25 years we have trained men for the electrical profession and **Our Graduates Have Succeeded in All Parts of the World.** Our 12 months intensive training is the boiled down essence of what **We Know** fits men for big paying positions. It is work you'll love. **No limit** to advancement. **Practical engineers teach you.** They know **What** to teach and **How** to teach it, **so you can earn money with it.** Hundreds of thousands of dollars worth of actual commercial machinery to work on in this school.

SCHOOL of ENGINEERING of Milwaukee
Founded 1903 A.W.S.-929 Milwaukee, Wis.

Uncle Sam Asks S. of E. OK!

Think of the opportunity to test plants such as this. The Nordberg Manufacturing Company is only one of many large concerns that is co-operating with School of Engineering students. This type of practical work, while in school, insures your future when you graduate. That's why our men are always in demand and always command big salaries. You can be one of these men if you ACT!

Earn While You Learn

By our special system you may earn part of your way while learning. Our Employment Department will help ambitious men who can finance their tuition to secure a position to which they may devote a part of each day, spending the remainder at the school. Low tuition fee. Board and room reasonable. Daily broadcasting WISN (formerly WSOE). School Orchestra. Fraternities.

Write for FREE Catalog

Write today for our free, illustrated catalog. Read about this wonderful institution and the great opportunities that lie before you. Find out about our specialized method of training and the details of our "Earn While You Learn" plan.

Radio and Electrical Refrigeration

Learn in three months — just 90 days and you can be one of the new group of trained men who will guide and develop the newest and best paying of America's gigantic industries. Radio and Electric Refrigeration are tremendous money makers for the trained man who gets into the game early. Experts are needed for big, responsible, well-paying jobs. We train you quick and help place you in a good position. ACT NOW!

FALL TERM OPENS NOW

School of Engineering of Milwaukee,
Dept. A.W.S.-929, Milwaukee, Wis.

Without obligating me in any way please mail free Photo Story book, "Rise to Success Through Electricity" (just off the press), and NEW Bulletin regarding the course I have marked with an X.

[ ]Commercial Elec. Eng. for High School Grad., 1 year
[ ]Commercial Elec. Eng. Others 1 to 2 years
[ ]Elec. Eng., B.S. Degree 3 yrs.
[ ]Automotive Elec.
[ ]Elec. Refrigeration
[ ]Radio
[ ]Armature Winding
[ ]Light, Heat & Power
[ ]Practical Electricity
[ ]Home Lab. Service
[ ]If am interested in your Earn While You Learn Plan.

Name..... Age.....
Address.....
City..... State.....
Education.....